ebruary 20, 1961
Volume 50, No. 4

OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AMERICAN

# DYESTUFF REPORTER

TEXTILE WET PROCESSING

It is vital to the industry that we be of the greatest service to you. Challenging ...but interesting months are ahead. CIBA's information reserve is most rewarding to those who use it well. What product information on this cover would be of most help to you?

C I B A

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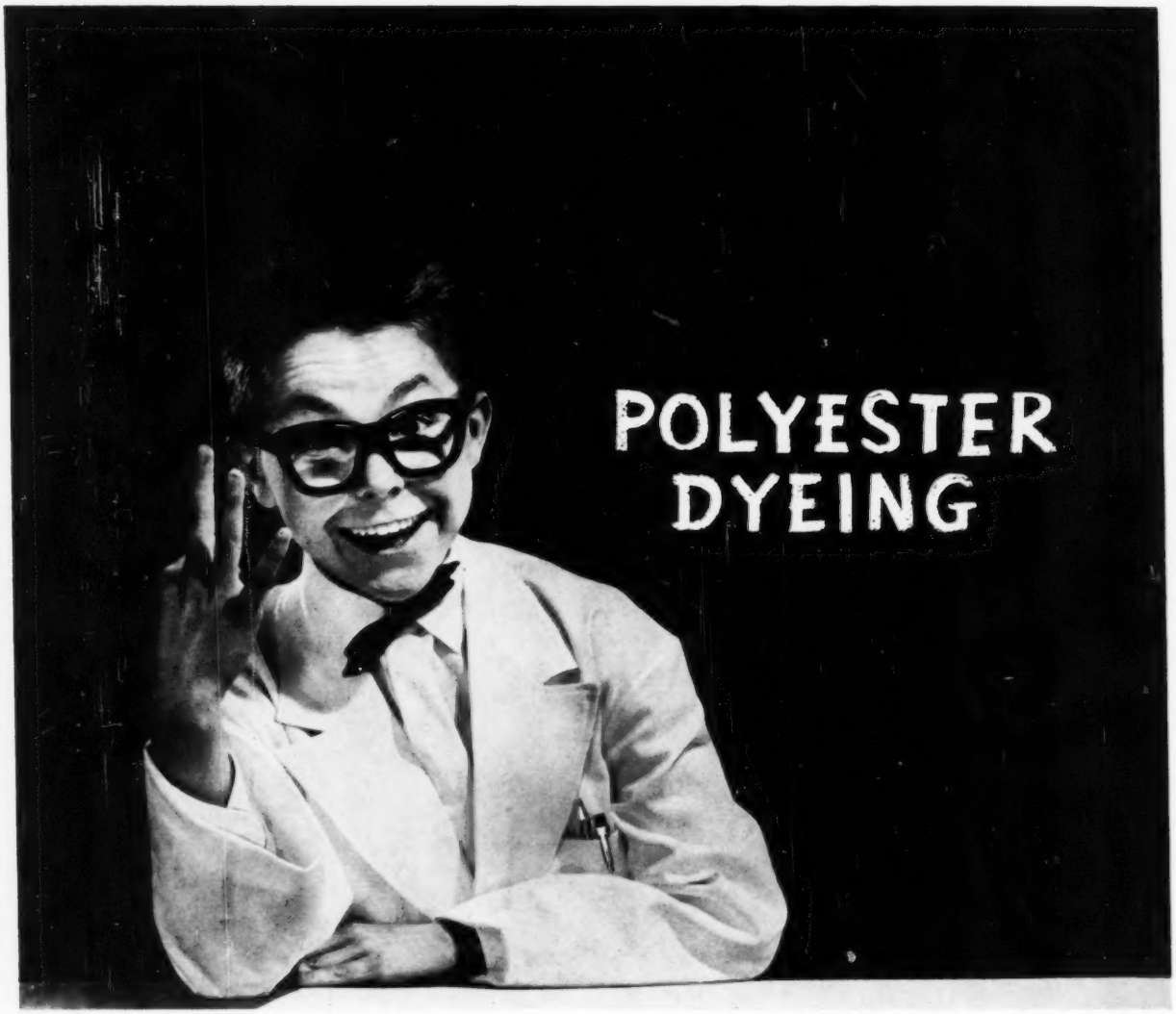


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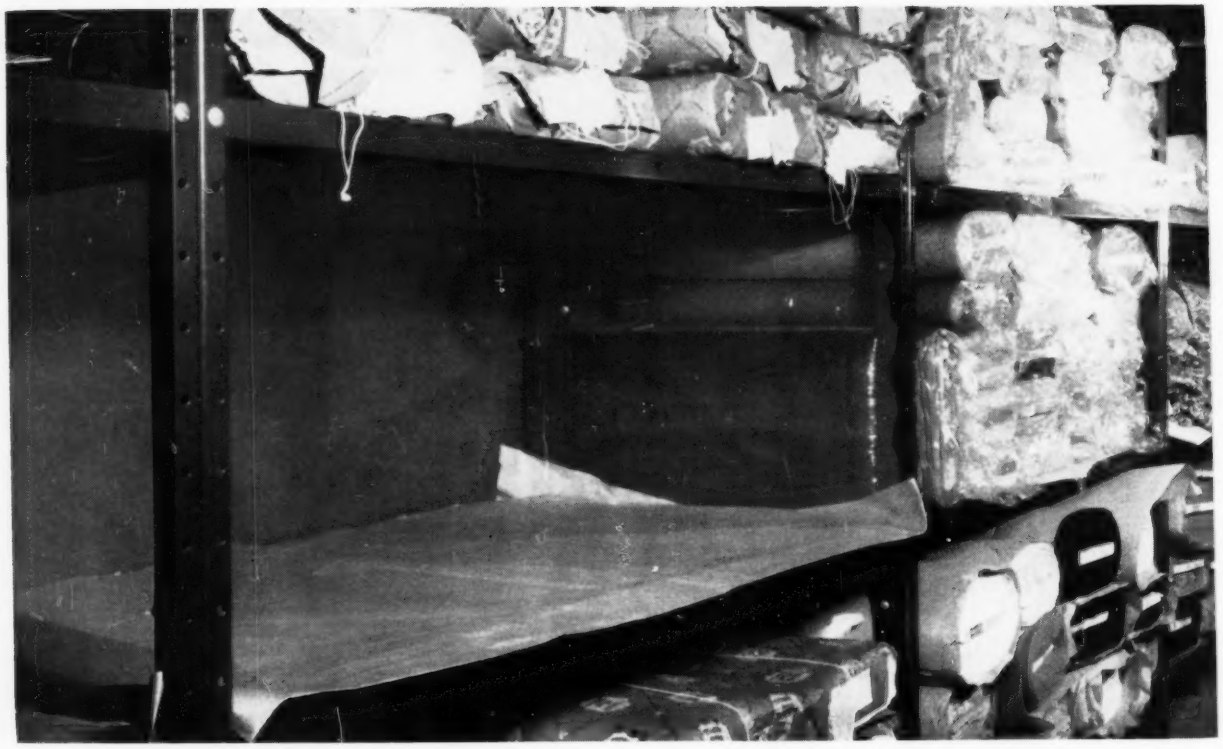

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| Property | Epolene E | Epolene LVE | Epolene HDE |
|---|---|---|---|
| Molecular Weight | 2500 | 1500 | 1500 |
| Density | 0.938 | 0.939 | 0.956 |
| Ring and Ball Softening Point, °C. (ASTM D-36-26) | 104-108 | 104-105 | 110-111 |
| Penetration Hardness (100 g./5 sec./77°F., tenths of mm.) | 2 | 5 | 1 |
| Color (liquid), Gardner scale, max. | 2 | 2 | 2 |
| Brookfield Viscosity (cps. @ 120°C.) | 1500 | 400 | 455 |

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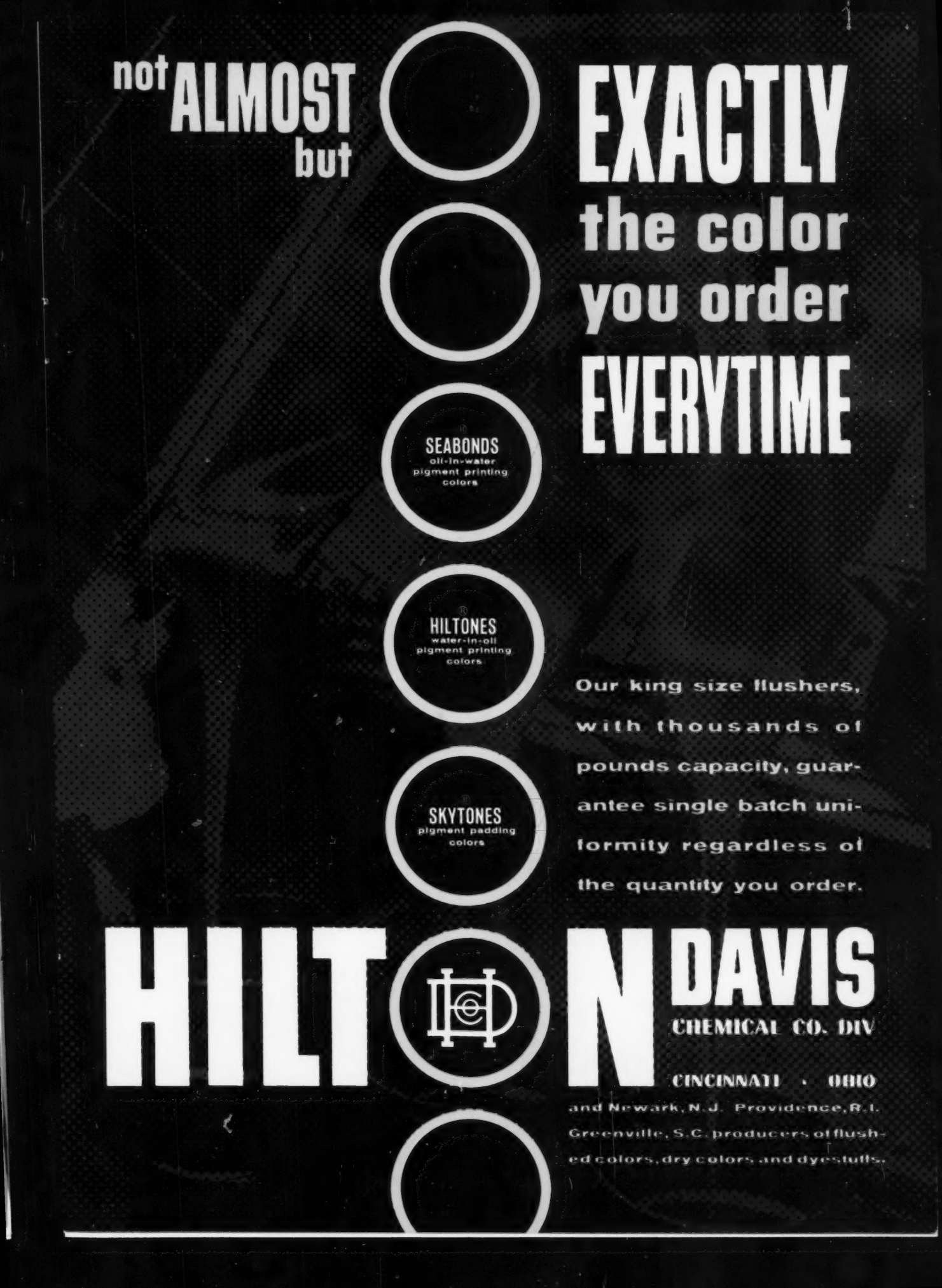
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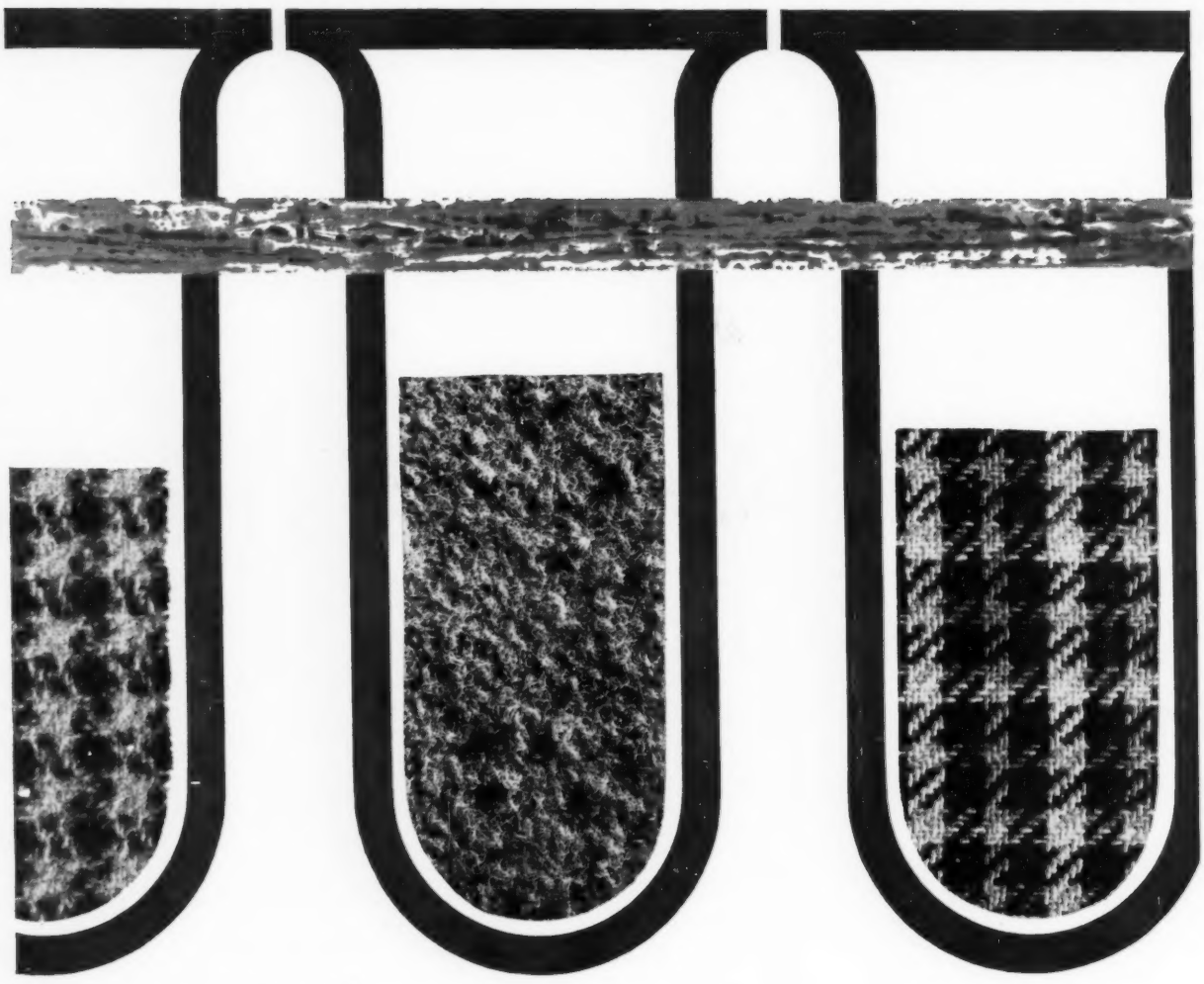

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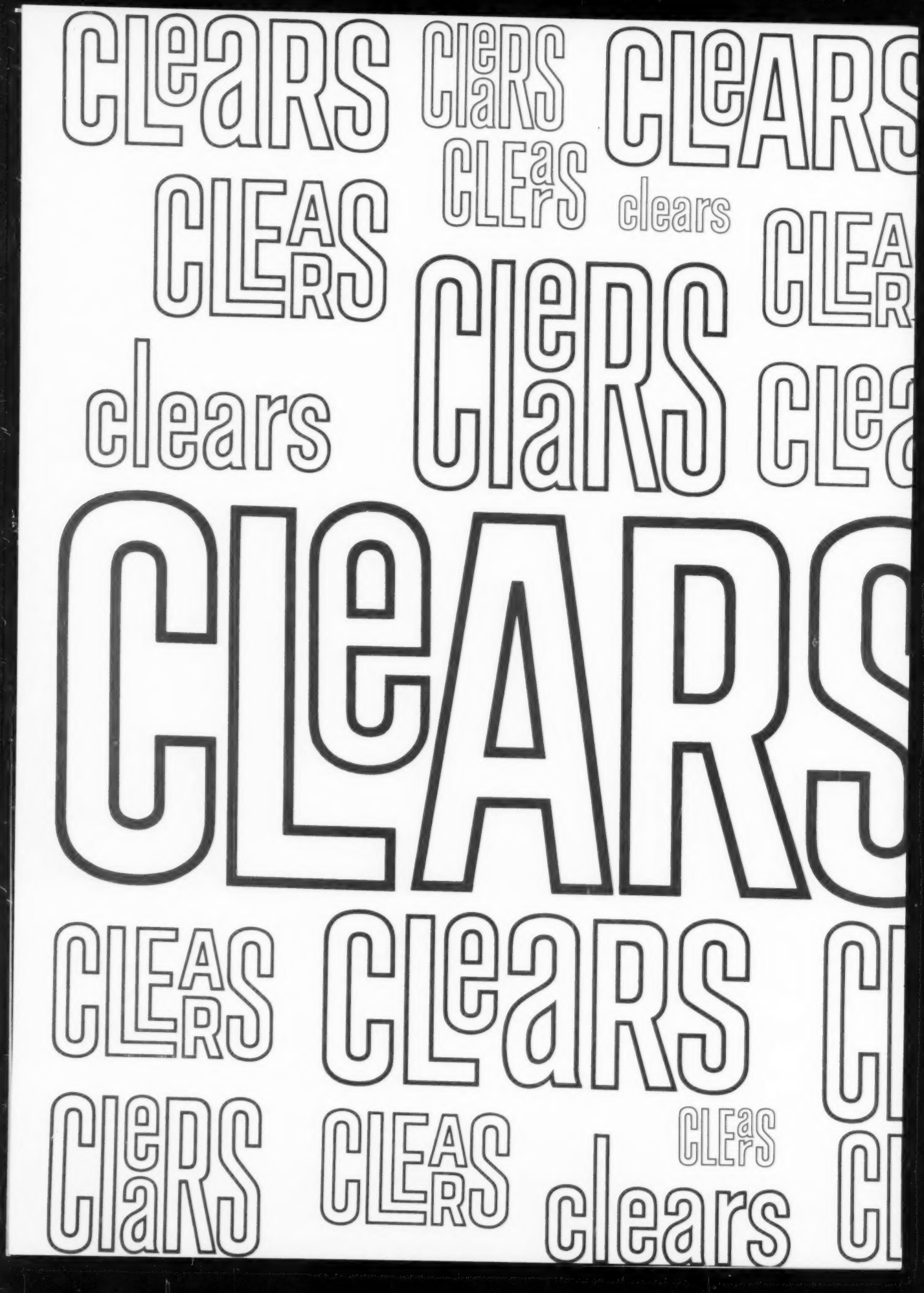
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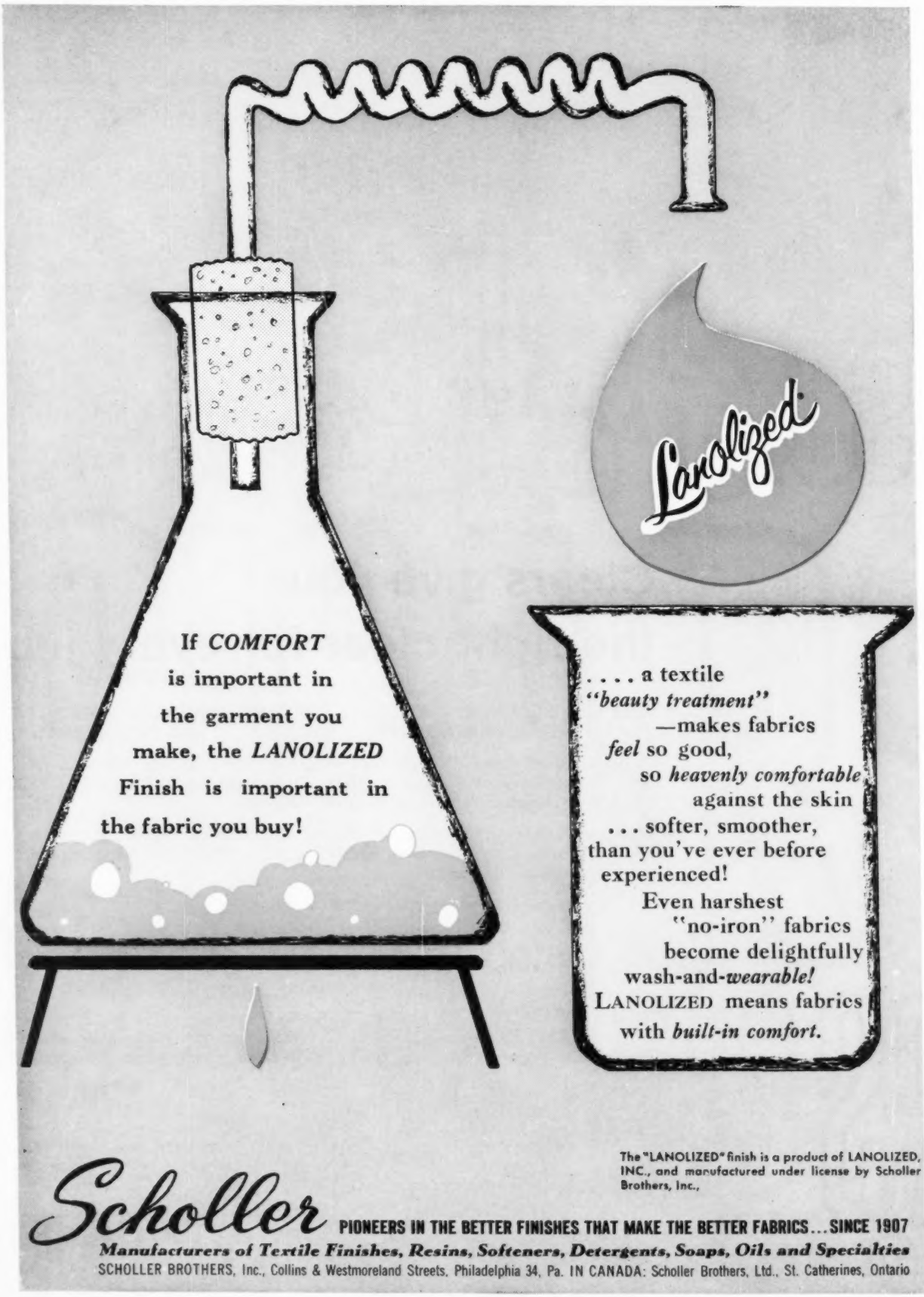
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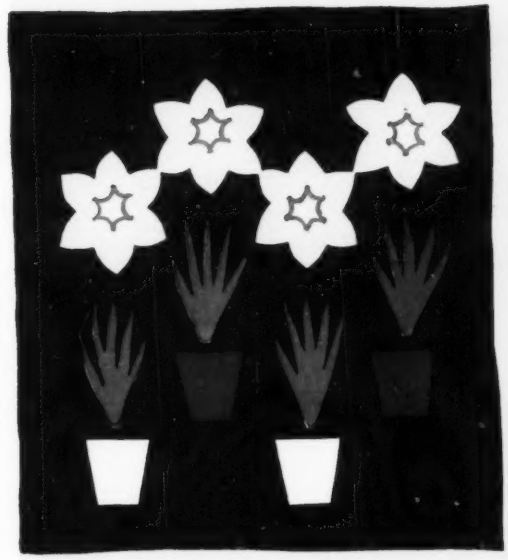

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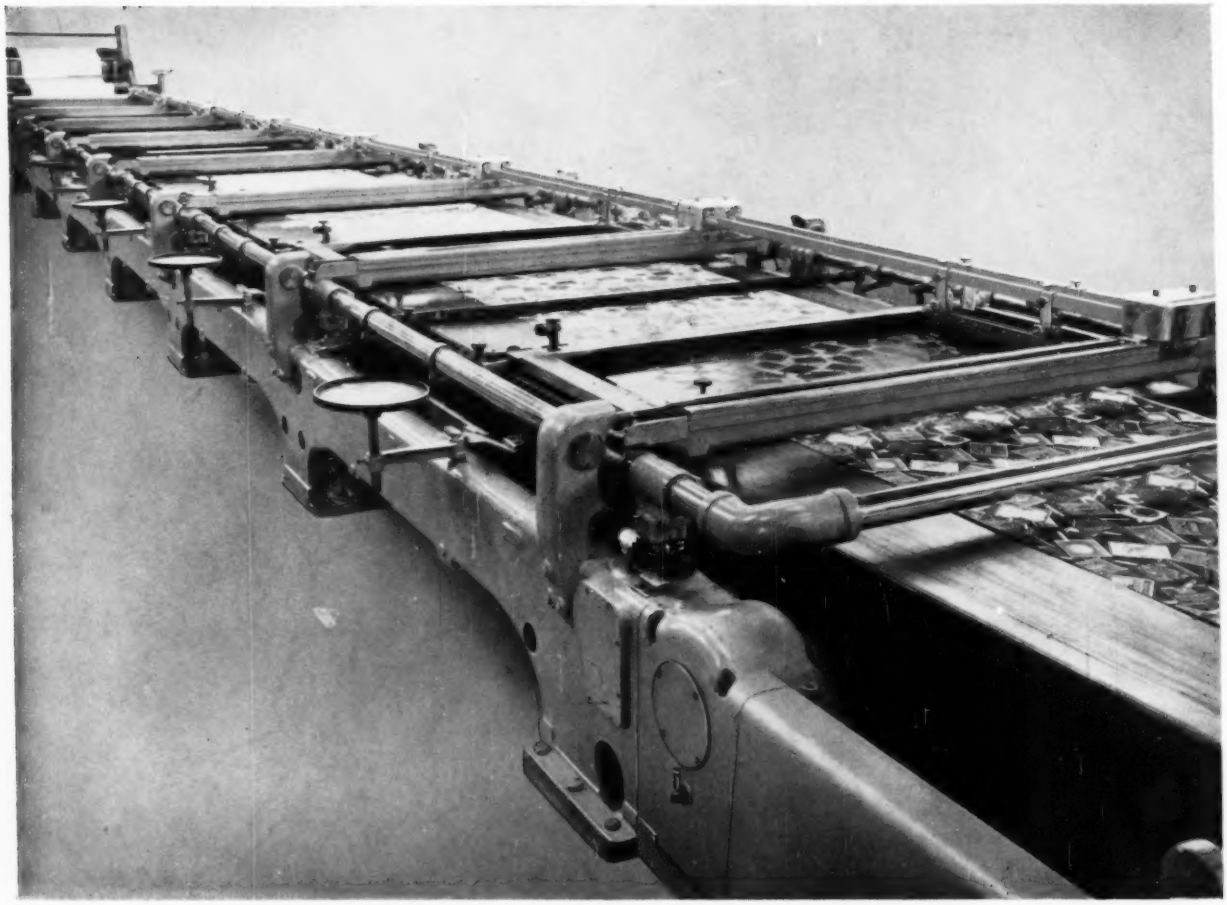

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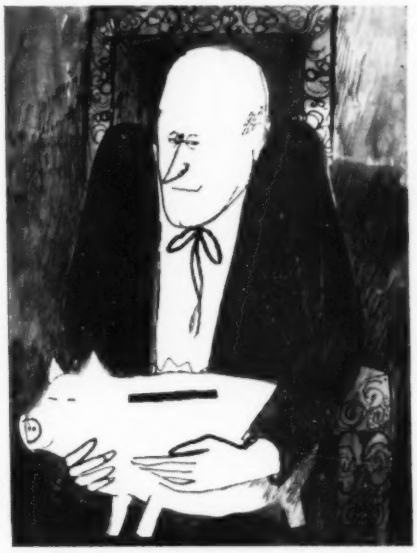

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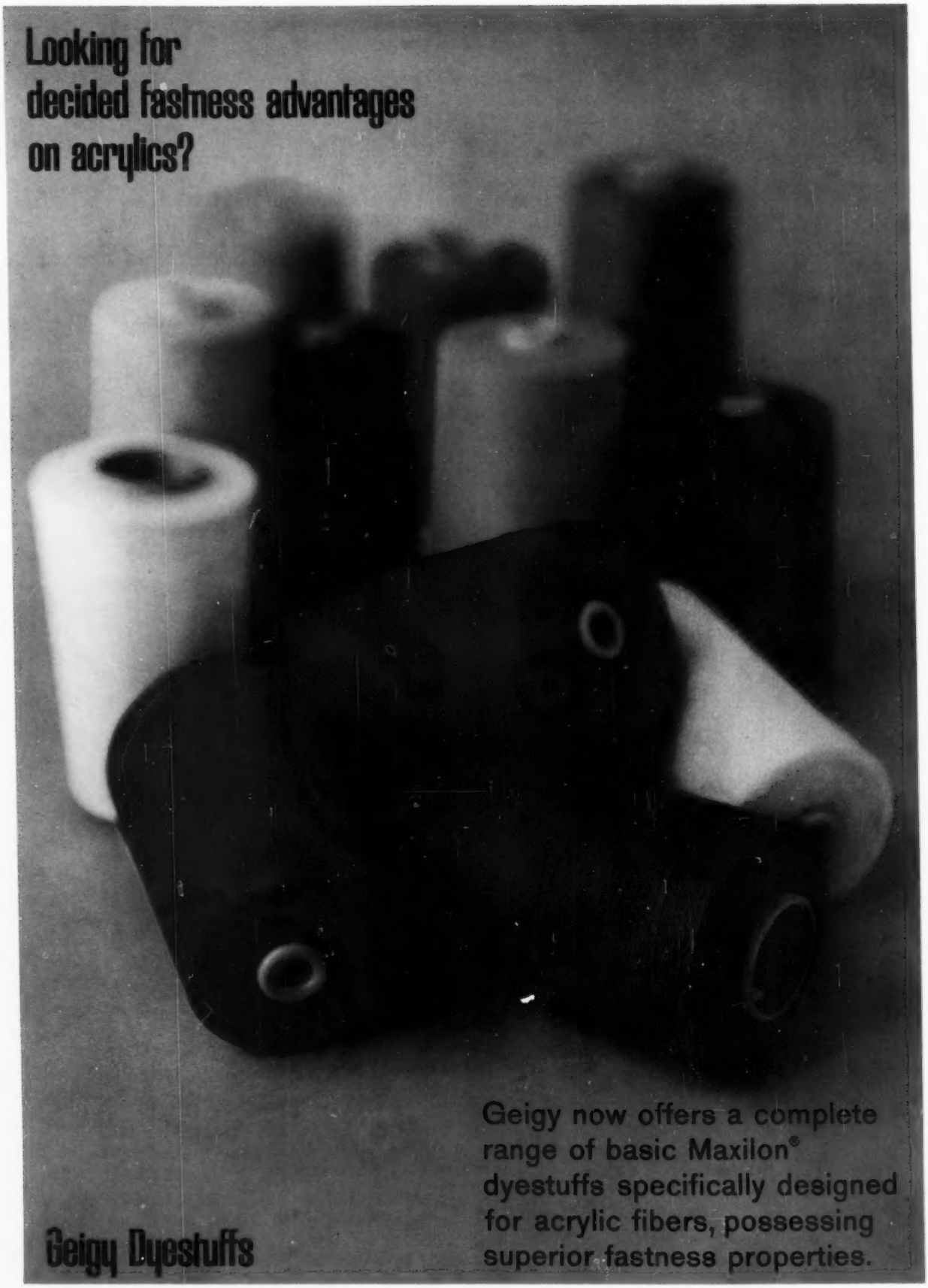
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American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday, by the **HOWES PUBLISHING COMPANY, INC.**, 44 East 23rd Street, New York 10, N. Y. **C. R. Howes**, President; **Ernest J. Finan**, Executive Vice-President; **Norman A. Johnson**, Vice-President & Treasurer; **Myron D. Reeser**, Vice-President; **Clara Patrick**, Secretary.

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AMERICAN
# DYESTUFF REPORTER
DEVOTED TO TEXTILE WET-PROCESSING

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*Dexter Chemical Corp*

*New York, NY*

"THE history of dyeing, isn't that a rather circumscribed field," remarked a friend of mine, a judge and a member of the state historical society. "After all," he continued, "the study of history should include the study of the development of our country and our state, its people, its struggles, its politics and the effects of politics on the development of business." "But," I answered, "the history of dyeing offers us a jumping-off place for the study of all of these things." For example:

Recently, a dealer in manuscripts, knowing of my interest in the history of dyeing and bleaching, sent me a note which said: "Are you interested in a New Jersey document, dated 1768, concerning silk and other textiles?" My answer was immediate and obvious . . . "Send me the document." Shortly there arrived a folded folio sheet which read as folows:

"An Act to Continue an act Entitled An Act for granting a Bounty upon the raising of Flax and Hemp and planting of Mulberry Trees in this Colony for raising of raw silk, so far as relates to Flax and Hemp.—

"Whereas an act passed in the fifth year of the reign of our Sovereign Lord King George the third entitled an act for granting a Bounty on flax and hemp and planting of mulberry trees, has by experience been found to be of publick utility and that part which relates to flax and hemp will soon expire by its own limitation.—

"Be it therefore enacted by the governor council and general assembly, and it is hereby enacted by the authority of the same, that such part of the said act entitled an act for granting a bounty on flax and hemp and planting of mulberry trees in this colony for raising of raw silk as relates to flax and hemp shall be and is hereby continued and every article and clause therein contained shall be and remain in full force from the publication hereof to the first day of October—which will be in the year of our Lord one thousand seven hundred and seventy two, and from thence to the end of the next session of general assembly and no longer.—

"Council Chamber April 23, 1768—This Bill having been three times read in Council—Resolved that the same do pass. By order of the House—Peter Kembley Speaker Council Chamber May 10th, 1768

"House of Assembly April 19th, 1768—This Bill having been three times read in the House of Representatives—Resolved that the same do pass. By order of the House ——Cortland ———— Speaker

"I assent to this Bill enacting the same and order it to be enroll'de.

(Signed) Wm. Franklin"

Now, this document is interesting as a nice piece of Americana for it is signed by William Franklin, Benjamin Franklin's son, who had been Franklin's assistant on the famous kite experiment, and his companion on the first mission to London for the American colonies. On Benjamin's return to America however:

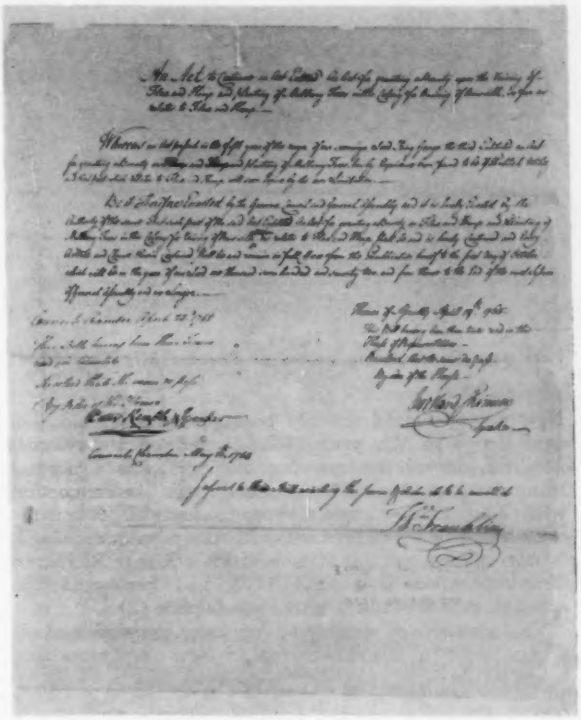
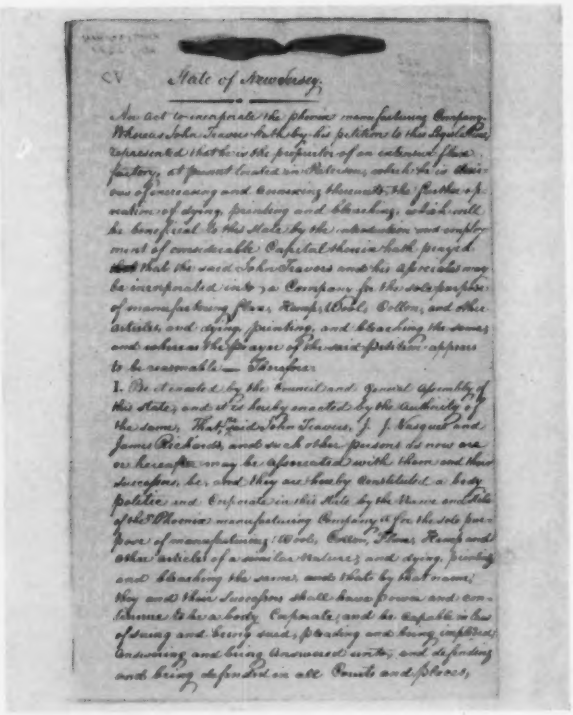


**Figure 1**
**Document signed by William Franklin in 1768. Bounty for growing flax and hemp in New Jersey.**

"William Franklin had not come with his Father. Before the Convoy sailed, the son had been appointed Governor of New Jersey, by Lord Halifax, President of the Board of Trade, at the request of Lord Bute, Secretary of State and favorite Minister of George III.—There is no good reason to doubt that the Ministry had in mind that if Franklin's son were a Governor, Franklin might be more tractable to the Governor and the proprietors of Pennsylvania. Thomas Penn believed he would." (*1*).

As far as textiles are concerned, however, the document does not furnish us with any unusual information. One would expect that the government of the colony of



CV State of Newbersey

An act to incorporate the phenix manufacturing Company
Whereas John Travers hath by his petition to this Legislature
represented that he is the proprietor of an extensive flax
factory, at present located in Paterson, which he is desi-
rous of increasing and annexing thereunto the further operation
of dying, printing and bleaching, which will
be beneficial to this State by the introduction and employ-
ment of considerable Capital therein hath prayed
that the said John Travers and his associates may
be incorporated into a Company for the sole purpose
of manufacturing flax, Hemp, Wool, Cotton, and other
articles, and dying, printing, and bleaching the same,
and whereas the prayer of the said petition appears
to be reasonable — Therefore

I. Be it enacted by the Council and General Assembly of
this State, and it is hereby enacted by the authority of
the same, That the said John Travers, J. J. Nasques and
James Richards, and such other persons as now
or hereafter may be associated with them and their
successors, be, and they are hereby constituted a body
politic and Corporate in this State by the name and stile
of the "Phoenix manufacturing Company" for the sole pur-
pose of manufacturing Wool, Cotton, flax, Hemp and
other articles of a similar nature; and dying, printing
and bleaching the same, and that by that name
they and their Successors shall have power and con-
tinue to be a body Corporate, and be capable in law
of suing and being sued, pleading and being impleaded,
answering and being answered unto, and defending
and being defended in all Courts and places,

**Figure 2**
**First page incorporating papers of Phoenix Mfg Co (1824)**

New Jersey would actively be supporting all kinds of agriculture in the year 1763. Promotion by colonial governments of the growing of fibers was a normal thing in those days. Furthermore, "silk" in connection with New Jersey certainly seems natural. Even the association of Franklin's son with the promotion of silk is not unexpected, for it is well known that Benjamin Franklin himself, around 1770, had promoted the erection of a silk filature in Philadelphia (2).

The manuscript dealer, having now assured himself of my apparent special interest in New Jersey textiles, again wrote—

> "I can offer you the original incorporation papers of the Phenix Manufacturing Company of Paterson, New Jersey, dated 1824."

This, I thought, would be another association item relating to the silk industry of New Jersey. After all, "Phoenix Silk" was an old name in Paterson, and this document probably described its very beginning. The document was ordered, received and carefully read. Surprisingly, there was no mention of silk. But, after all, not every mill in New Jersey had to begin as a silk mill, and perhaps the Phoenix Silk Company was one of these exceptions. From the standpoint of the history of dyeing and finishing, however, this document is especially interesting because it has to do with the very first attempts at dyeing and finishing on a large industrial scale in New Jersey.

The opening paragraphs are of particular interest to us and read as follows:

> "An act to incorporate the Phenix Manufacturing Company.—Whereas John Travers hath by his petition to this Legislature, represented that he is the proprietor of an extensive flax factory, at present located in Paterson, which he is desirous of increasing and annexing thereunto the further operation of dying, printing and bleaching, which will be beneficial to this state by the introduction and employment of considerable capital herein hath prayed that the said John Travers and his associates may be incorporated into a company for the sole purpose of manufacturing flax, hemp, wool, cotton, and other articles, and dying, printing, and bleaching the same, and whereas the prayer of the said petition appears to be reasonable—Therefore:
> I. Be it enacted by the Council and General Assembly of this state, and it is hereby enacted by the authority of the same, that, the said John Travers, J. J. Nasques and James Richards, and such other persons as now are or hereafter may be associated with them and their successors, be, and they are hereby constituted a body politic and corporate in this state by the name and stile of the "Phoenix Manufacturing Company" for the sole purpose of manufacturing wool, cotton, flax, hemp and other articles of a similar nature; and dying, printing, and bleaching the same, . . ."

The incorporation actually took place in 1824, for on the back of the document under the date of November 15, 1824, there is the notation that "This bill having been three times read is passed, in the House of Assembly." Now, "The Phoenix" was not intended to be a fly-by-night company. In fact, we know that this company and its heirs were in active operation for over a hundred years. The act of incorporation required that the company not begin operation until "when as so soon as $200,000.00 of the said capital stock shall have been subscribed, paid, or satisfactorily secured, to be paid . . ." Now, $200,000.00, in 1824, was a considerable sum. Not only would this have been enough to erect a magnificent building but a considerable amount would have been left over for working capital. Perhaps the success of the company over so long a period of time was due to its solid financial foundation.

The year 1824 was a milestone in the history of American manufacturing, not only for textiles, but also for many other articles. On January 9, 1824, John Tod, chairman of the House Committee on Manufacturers, introduced into Congress a bill providing for higher tariffs on the importation of manufactured goods. While the first protective tariff law had been passed in 1816, restrictions had been put around it so that it was actually ineffective. The bill introduced by Tod, with the support of Henry Clay and others, passed Congress on May 19, 1824, and was approved on May 22nd. This bill raised the rate of duty to 40½% on the total imports which were to be brought in during the next four years (3). This tariff was apparently the assurance of success that the incorporators of "The Phoenix" needed to make them risk the then enormous sum of $200,000 in the manufacturing, dyeing, printing and bleaching of textiles.

Soon there came another offering from our dealer. This time it was the incorporation papers of "The New Jersey Bleaching, Printing and Dying Company," also incorporated in 1824. Obviously, the new tariff law of 1824 was having a very definite effect on the textile industry of New Jersey. Witness the opening paragraph of this document:

> "Whereas it is represented to this Legislature, that a subscription has been made for the purpose of introducing and establishing a bleaching, printing and dying company in this state, — and whereas the said subscribers request the aid of the Legislature of this state, to promote the views of said company, and whereas it appears to this Legislature, that the

granting of such aid will protect and encourage American manufacturers and stimulate the laudable enterprise of the said company, and enable them to compete with foreign manufacturers, and thereby be conducive to public good,—Therefore,

I. Be it enacted by the Council and General Assembly of this state, and it is hereby enacted by the authority of the same, that Jas. W. Stephens, John W. Berry, Joseph Smith, Leonard Ogilby, Benjamin Armitage, William Chapman, and all such persons as now are or hereafter shall become stockholders of said company, shall be and hereby are ordained constituted and declared to be a body Corporate and politic in fact and in name, by the name of the "New Jersey Bleaching, Printing and Dying Company, . . ."

Now, the financial foundations of the "New Jersey Dying" were to be nowhere near as strong as that of "The Phoenix." The latter was a manufacturing unit already in operation at the time of its incorporation in 1824 into the enlarged company which also was to do dyeing and printing. The "New Jersey Dyeing" was to start from scratch. According to the Incorporation Papers, as soon as $30,000 had been subscribed and actually paid, the corporation could begin business. The papers say nothing about the type of textiles or fibers that the company was to print, dye or bleach. They did make sure that they had the rights to "manufacture bleaching liquid or salt and all kinds of materials used in printing, bleaching or dyeing, or for other manufacturing purposes." Certainly silk could have been one of the fibers planned for dyeing.

We do know that the New Jersey Bleaching, Printing and Dying Company actually did begin operation through notices that appeared in some of the contemporary newspapers. In the *New Jersey Eagle* (Newark) of September 23, 1825, we learn that the New Jersey Bleaching, Printing and Dyeing Company had an office at 54 Pine Street, New York, NY, and that its works were at Belleville, NJ. Benjamin Armitage, the president of the company, advised that:

> "A further installment of 15% (being $7.50 on each share) is required to be paid by the stockholders of this company on or before the 20th of October next; or in default thereof, such share or shares and all the previous payments thereon, shall be forfeited."

By 1828, the New Jersey Bleaching, Printing and Dyeing Company had gotten into trouble, for in the 'Centinel of Freedom,' of March 18, 1828, there appears a notice to the effect that—

> ". . . the stock-holders of the Belleville Manufacturing Co., late the New Jersey Bleaching, Printing and Dyeing Co., will hold an election of directors on April 7th at Van Buskirk's hotel in Hoboken."

The "New Jersey Bleaching" did not even last four years in spite of high tariff protection. Perhaps a more solid financial foundation would have assured success.

Now, so far, our dealer had furnished us with three interesting documents relating to the textile industry of New Jersey, but only one mentions silk, and this only in connection with the raising of mulberry trees. There then comes an offering of the Incorporation Papers of "The American Print Works" in 1833. Surely, this will have to do with the dyeing or printing of silks.

The document which passed the Legislature after three readings on February 16, 1833, begins—

**Figure 3**
**Johnson's Mill, Newark, NJ, operated as a fulling and dyeing establishment in 1790. (From a 1916 photograph).**

> "Whereas Andrew Gray hath, by his petition to this Legislature, represented that he is the proprietor of an extensive and valuable bleaching, printing and dyeing establishment, located at Belleville, in the County of Essex, and that by reason of the great extent of said establishment, and the large capital required to carry on the same with advantage, it is inconvenient and difficult to be managed by one individual, and praying the Legislature to incorporate the said Andrew Gray and his associates for that purpose: and it appearing to the Legislature that the prayer of the petitioner is reasonable, and that the encouragement of manufactures is calculated to promote the public good, Therefore,
> "Sec. 1. Be it enacted by the Council and General Assembly of this state, and it is hereby enacted by the authority of the same, that the said Andrew Gray, George Harden, William Johnson, and William Smith, and such other persons as now are, or hereafter may be associated with them and their successors, be, and they are hereby constituted a body politic and corporate in this state, by the name and style of 'The American Print Works,' for the purpose of bleaching, printing and dyeing woollen, cotton, and other kinds of goods. . ."

The act required that at least $100,000 of the capital stock be subscribed before the corporation could begin business. Nowhere, however, is there any mention of silk. Perhaps "the other kinds of goods" meant silk. No records have been found which tell us what happened to the American Printing Company.

Now, my curiosity had been piqued. What was the real story of the dyeing and finishing industry of New Jersey? When did it begin and when did silk begin to play an important part?

Undoubtedly, the earliest commercial wet processors of textiles in New Jersey as well as in the other colonies, were the fullers. Up until the end of the 18th century, the textile industry of the United States had been a home industry. The colonies themselves had never really been permitted to build up a textile industry. England had insisted that the colonies be producers of raw materials and that she herself be their manufacturer. Spinning and weaving within the home, however, was not completely discouraged. Most of the inhabitants, in the early days of this country, did not live in coastal cities and could not afford imported fabrics. For them, most everything had to be home-made, and homespuns for every member of the family were the order of the day. Wool was the main fiber and it was spun and woven in the home to make a variety of

**Figure 4**
**The falls of the Passaic River at Paterson (1960).**

**TABLE II**
**Fulling mills, woolen factories, cotton factories, etc, in New Jersey, 1830**

| *County* | *No. of fulling mills* | *No. of cotton factories* | *No. of woolen factories* | *No. of carding machines* | *Population* |
|---|---|---|---|---|---|
| Bergen* | 8 | 10 | 5 | 10 | 22,412 |
| Burlington | 7 | 4 | — | 11 | 31,107 |
| Cape May | — | — | — | 2 | 4,936 |
| Cumberland | 1 | — | 1 | 3 | 14,093 |
| Essex* | 1 | 22 | 13 | 5 | 41,911 |
| Gloucester | 4 | 2 | 2 | 4 | 28,431 |
| Hunterdon | 10 | 1 | — | 17 | 31,060 |
| Middlesex | — | — | 2 | 7 | 23,157 |
| Monmouth | 6 | 1 | — | 17 | 29,233 |
| Morris | 12 | 5 | — | 11 | 23,666 |
| Salem | 6 | — | — | 2 | 14,155 |
| Somerset | 8 | — | — | 11 | 17,689 |
| Sussex | 7 | — | — | 18 | 20,346 |
| Warren | 2 | — | 2 | 16 | 18,627 |
| Totals | 72 | 45 | 25 | 134 | 320,823 |

* Passaic county was carved out of Essex and Bergen counties in 1837.

**TABLE I**
**Woolen manufacturing and fulling mills by counties, 1810**

| | *Woolen goods in families, etc* | | *Fulling mills* | | | |
|---|---|---|---|---|---|---|
| *County* | *Yards Made* | *Value in dollars* | *No.* | *Yards fulled* | *Value in dollars* | *No. of carding machines* |
| Essex | 43,000 | $40,000 | — | 43,000 | $ —— | 6 |
| Sussex | 97,561 | 73,170 | 11 | 59,000 | 73,750 | 28 |
| Hunterdon* | 48,477 | 36,357 | 4 | 21,700 | 27,125 | 19 |
| Burlington | 34,123 | 34,123 | 4 | 19,000 | 23,750 | 16 |
| Monmouth | —— | —— | 2 | 13,500 | 16,875 | 4 |
| Morris | 60,830 | 45,628 | 8 | 32,440 | 41,050 | 10 |
| Middlesex | 35,831 | 83,140 | 5 | —— | —— | 7 |
| Gloucester | —— | —— | 2 | 2,500 | —— | 7 |
| Somerset | —— | —— | 6 | —— | 14,450 | 15 |
| Salem | 13,200 | 9,900 | 3 | 13,500 | 16,880 | 2 |
| Bergen | 11,739 | 14,673 | 3 | —— | —— | 7 |
| Cumberland | 29,552 | 23,641 | 4 | —— | —— | 7 |
| Cape May | —— | —— | — | —— | —— | — |
| Total | 374,313 | $360,632 | 52 | 204,640 | $213,880 | 128 |

*In addition, there were 278 woolen blankets made with a value of $1,112, and 200 yards of carpeting and coverlets valued at $60.

fabrics. Every town, every little village, and most crossroads, had its fuller. For a charge, the fuller would wash and full the homespun fabrics. Most fullers were also dyers and while not generally experts, they could dye most of the limited number of shades required at the time. In addition, some of the fullers actually engaged in carding yarn for sale to the country people.

Recently, Harry Weiss and Grace Ziegler have put together a rather complete story of the early fulling mills of New Jersey (4). According to these authors, the earliest record of a fulling mill in New Jersey, which they could find, was that of one belonging to William Lawrence, in Middletown Township, Monmouth County, around 1667. Another early one was owned by John Ogden, and was located south of the Red Lion Inn, in Elizabethtown, sometime around 1667. For the period 1667 to 1780, Weiss and Ziegler were able to find records of sixty different fulling mills in the state of New Jersey, although there may have been even more whose records have not as yet appeared (5).

Even by 1810, sizable factories, for the manufacture of woolens or cottons, had not really appeared in New Jersey. In 1810, the amount of cotton and wool spun in mills in New Jersey amounted to only 8200 pounds, with a value of $9,225.00, and this activity was confined mostly to Morris County. At the same time, however, the manufacture of woolen goods in the home was of a much greater magnitude, and these fabrics were dyed and finished by the local fullers. Table I offers statistics from the 1810 census which show the extent of this home industry in New Jersey (6).

By 1830, however, things had changed. The number of cotton factories now amounted to forty-five, and the number of woolen factories were twenty-five. Also, for the most part, the woolen and cotton factories did their own dyeing and bleaching. The 1830 census tells the story (7). (See Table II).

By 1840, the fulling mills had declined to forty-nine, while the number of woolen and cotton factories had continued to increase.

By the end of the century, the country fuller was a curiosity. The fullers had become the actual proprietors of large spinning, weaving and dyeing plants. As far as silk is concerned, however, there is no indication of its manufacture into fabrics or its dyeing or finishing in the state of New Jersey until 1839.

Furthermore, it was not the Paterson and Passaic area where the early textile industry of New Jersey had its start but towns and villages where today textile manufacturing is unknown.

The first true silk mill in the United States was, undoubtedly, that of Horatio and Rodney Hanks, who erected their plant in 1810, in Mansfield, Connecticut (8). This mill, however, did no dyeing. By 1839, three silk companies had been formed in New Jersey. These were the Burlington Silk Growing and Manufacturing Company, in Burlington; Monmouth County Silk Man-

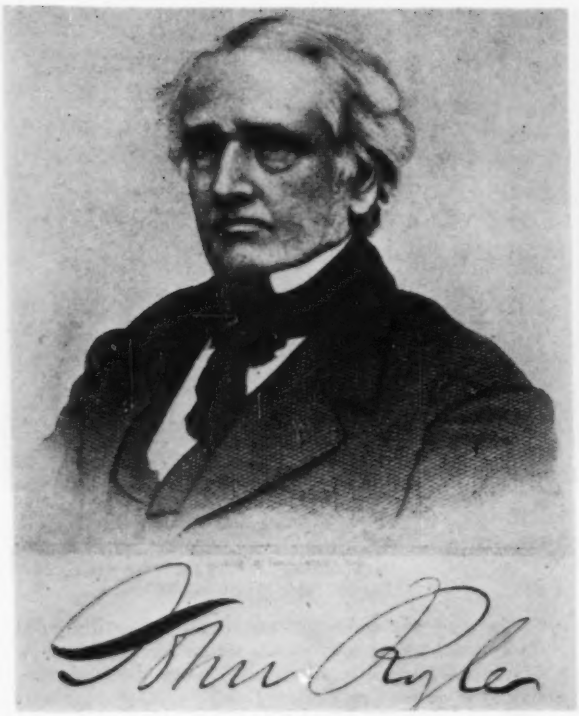


**Figure 5**

**John Ryle, "father of silk manufacturing in Paterson"**

**Figure 6**

**Residence of John Ryle, #12 Mill St, Paterson, still standing in 1927.**

**(From "The History of the Silk Dyeing Industry in the United States" (8)**

ufacturing Company, in Freehold, and Warren Silk Company, in Warren (*9*). The eastern part of the state, which was to become so important in the manufacture and dyeing of silk, had not yet taken its key place in the industry.

While the city of Paterson is synonymous with silk processing in the twentieth century, its importance as a place of silk manufacturing in the United States was a recent thing, historically speaking. The story of the foundation of Paterson, its association with Alexander Hamilton, Major Pierre Charles L'Enfant and with silk should be retold.

In 1791, several public-spirited citizens of New Jersey organized "The Society for the Establishment of Useful Manufactures," (SUM), with the intention of making use of the Falls of the Passaic for industrial purposes, at a site which is today Paterson. Particularly, the Society planned to use the water power in the manufacture of cotton fabrics. Alexander Hamilton himself was interested in the syndicate, and he has usually been credited with the selection of the site which supposedly came to his knowledge during the days when he was with the American Army which was encamped in 1780 in the vicinity of what is today Paterson. At that time, there was a small settlement of about a dozen houses and a tavern kept by the widow of Captain Abraham Godwin, a revolutionary patriot. The directors of the SUM met at the tavern the Fourth of July, 1792, and decided to put up money for the building of a factory for the weaving and printing of calico. The construction of a system of raceways was also authorized for the purpose of bringing the water from above the Falls to the waterwheels of the proposed mill. Major Pierre Charles L'Enfant, the French officer who had been awarded the honor of planning the new federal city of Washington, was chosen to supervise these operations.

By common consent, the name of Paterson, in honor of William Paterson, the then Governor of New Jersey, was given to the new community.

Peter Colt, of Hartford, was put in charge of the projects of the SUM. At that time, in 1793, the company was almost in trouble because of heavy outlays which had been required for the construction of the waterways. The first factory building was built in 1794 and cotton yarn was spun in it. In the same year, calico shawls and other cotton goods were printed, but the bleached and unbleached muslins were purchased in New York. In 1795-6, cotton fabrics were woven in Paterson for the first time. Things did not go too well, however, and the cotton mill closed down in 1796. The Society had also attempted the culture of the silkworm in 1794 but this operation was soon abandoned. In 1807, fire destroyed the Society's main mill and within a short time the Society abandoned manufacturing ventures, but kept its organization together for over a hundred years, devoting itself to real estate and to the production of water and electrical power (*10*).

The real father of the silk manufacturing and silk dyeing industry in Paterson was John Ryle. In 1840, on the fourth floor of the abandoned "Gun Mill," Ryle began the weaving of silk, as an employee of G W Murray of Northampton, Massachusetts. (The old Gun Mill had received its name because of its association with the colt family in the manufacture of automatic pistols in 1835.) By 1846, Ryle was the sole owner of the operation.. According to The "History of the Silk Dyeing Industry in the United States,"—

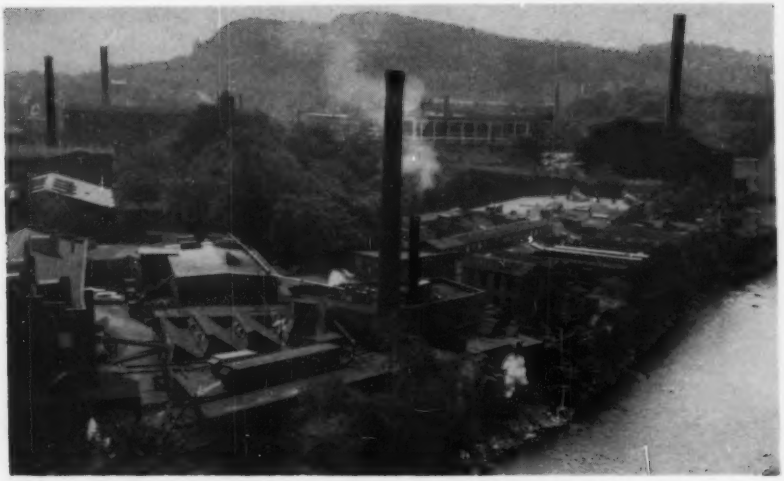


**Figure 7**

**The industrial complex below the Passaic falls in Paterson, 1960. Arrow shows part of old "Gun Mill" still being used for textile processing.**

**Figure 8**

**Entrance to the old Phoenix Building constructed in 1824. Keystone 1824 under sign. Summer, 1960.**

"During these half-dozen years, although the dyeing facilities of New England were at his service, John Ryle little by little acquired the science of doing this work for himself and at his own plant. The Passaic River then, as now, skirted the precincts of his mill-yard, and the situation was ideal for the purposes of a dyeing establishment.

"Mr Ryle was born at Bollington, near Macclesfield, England, Oct. 22, 1817. He first handled silk as a bobbin boy when he was five years of age, and from that time to the day of his death he was interested in the silk industry. He learned the manipulation of the fibre in all its branches, and at twenty-two years of age was the Superintendent in the mill of his two brothers, Reuben and William, in Macclesfield. On March 1st, 1839, he sailed for this country and obtained the position of superintendent in the small silk mill owned by Samuel Whitmarsh, at Northampton, Massachusetts, where he became acquainted with George W. Murray, who had been interested in silk manufacture in England before coming to this country. While in that position Mr. Ryle received an offer from his two brothers in Macclesfield to handle the product of their mill in this country, and for this purpose opened a store on Maiden Lane and William Street, New York City. Mr. Murray, however, induced him to abandon the business of importer, in order to join him in the actual manufacture of silk in this country. Mr. Ryle visited Paterson, where he became acquainted with Christopher Colt, who had experimented at making silk thread for about three months in the old Gun Mill, but had abandoned the project. The result of Mr. Ryle's visit to Paterson was that Mr. Murray purchased Colt's machinery, as it stood in the fourth story of the pistol factory, for $3,200. He put Mr. Ryle in charge under a contract for three year's employ. That was the foundation of successful silk manufacture in Paterson. Mr. Ryle was among the pioneer manufacturers of spooled sewing silk in this country. It is said that repeated conferences between himself and Elias Howe, the inventor of the Howe sewing machine, made it possible for the latter to overcome one of the chief difficulties he had in perfecting his sewing machine,—a way to feed the silk thread to the needle.

"Three years after the purchase of the mill, Mr. Ryle was taken into partnership, and the firm of Murray & Ryle did a flourishing business in the manufacture of sewing silk and twist until the year of 1846, when Mr. Ryle, assisted by his brothers in England, was enabled to buy out Mr. Murray's interest. Up to this period Mr. Ryle had not attempted weaving broad goods, but as soon as he became sole owner of the establishment he proceeded to carry out this daring idea. He set a few looms at work and produced several pieces of dress silk of a thousand yards' length. In 1847 he still further expanded his facilities by purchasing the building that contained his machinery. To complete his knowledge of silk manufacture, he went to Europe in 1850 and visited the principal factories of France and Italy." (*11*).

In addition to his industrial activities, Ryle devoted himself to the welfare of Paterson. In 1869 he was elected mayor in appreciation of his public spiritedness. Ryle died November 6, 1887, while on a visit to England. His remains were returned to Paterson where he was buried.

Today, New Jersey is one of our great manufacturing states and Paterson is one of its most important centers. But textile manufacturing is no longer the King. A visit to the Paterson area today reveals very few of the great silk dyehouses still operating. Electronics, plastics and chemicals are now "The Queens." Many of the buildings where most of the silks for America were dyed still remain. For the most part, however, they house other industries. The waters of the Passaic still rush noisely over the historic falls, but they sing of other days.

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(*4*) Weiss, Henry B and Ziegler, Grace M, "The Early Fulling Mills of New Jersey" (1957).
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(*7*) Ibid, p 24.
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# APPLICATION OF THE APO-THPC FLAME RETARDANT TO COTTON FABRIC

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A typical laboratory and commercial procedure for the application of the APO-THPC flame-retardant to cotton fabric is given. The finish can be readily applied to cotton using commercial equipment, the resulting fabric properties being comparable to those of fabrics processed in the pilot plant. Commercial processing by various finishers necessitated some modification in the laboratory technique to adapt it to existing equipment.

The functions of the various components of the treating solution and the necessary precautions to be observed during fabric processing are discussed.

## INTRODUCTION

THE fire hazards associated with the use of combustible fabrics for decorative or utilitarian purposes have caused intensification of research to develop improved durable flame-retardant finishes for use by the textile industry. In modern warfare the use of incendiary weapons, such as napalm bombs, phosphorus grenades, flame throwers and high-energy radiating explosives makes it mandatory for our military forces to be equipped with flame-retardant textiles. Interest by civilian and industrial groups in flame-retardant textiles is increasing as shown by Public Law 88 of the 83rd Congress which bars dangerously flammable fabrics from interstate commerce.

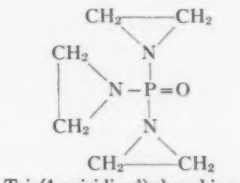
Many of the existing flame-retardant processes have one defect or another, which renders them unsuitable for general application to textile products. The defects may be objectionable changes in hand, appearance, texture, flexibility, inadequate fastness to repeated launderings, possible irritating action on the skin, lowered air or water permeability, excessive add-ons, lowered breaking or tearing strengths, technical difficulties or expense in applying the processes, poor resistance to dusting or stickiness at elevated atmospheric temperatures.

The task of developing a satisfactory flame retardant for cotton is important and difficult because of the many requirements a generally satisfactory flame retardant must meet simultaneously. To meet the requirements, the finish must be:

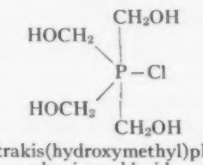
1) Applicable from water solution, preferably.
2) Easily applied, preferably on existing finishing equipment.
3) Capable of being processed without objectionable odor and toxic fume development when applied with conventional ventilation.
4) Durable to laundering and drycleaning.
5) Resistant to strength damage from chlorine bleach.
6) Able to form a tough char when exposed to high-energy irradiation.
7) Efficient and preserve the natural fiber character after application; and at the same time render it glow and flame resistant.
8) Void of adverse physiological reactions to persons handling or exposed to the treated fabric.
9) Suitable for further finishing such as dyeing or application of a water repellent.
10) Reasonable in cost, particularly when put into large-scale use.

This paper covers development of pilot plant and commercial application of our most recent flame retardant which meets the above requirements.

This flame retardant is based upon a new thermoseting resin made by reacting a rather unusual compound, tris-(1-aziridinyl)phosphine oxide abbreviated "APO" (*1*) with tetrakis(hydroxymethyl)-phosphonium chloride, abbreviated "THPC" (*2*). The structures are shown in Figure 1.



Tris(1-aziridinyl)phosphine oxide



Tetrakis(hydroxymethyl)phosphonium chloride

**Figure 1**

APO is prepared in good yield by reacting ethyleneimine with $POCl_3$. The reaction may be represented as follows:

$$POCl_3 + 3HN\overline{CH_2-CH_2} + 3R_3N \rightarrow [\overline{CH_2-CH_2-N}]_3P=O + 3R_3NHCl$$

[1]One of the laboratories of the Southern Utilization Research and Development Division, Agricultural Research Service, US Department of Agriculture.

Chemical companies have recognized the potentialities of APO. Six of these companies have already developed satisfactory pilot-plant methods for its production and made it available. THPC is already available commercially. It has been indicated that the cost of APO based on a large-scale production will be acceptable to the industry.

The treating solution is easily prepared by mixing the chemical components APO, THPC, triethanolamine, and a suitable wetting agent with water. The flame-retardant solution is then applied to the fabric with a high-pressure padder, usually with two dips and two nips. After padding, the fabric is dried at a relatively low temperature, cured at an elevated temperature, washed, dried in the open width, and softened.

TYPICAL APPLICATION———The following description of a laboratory pilot-plant application to several hundred yards of 8.5-oz OD sateen fabric illustrates a typical application procedure. [See Section A of Discussion.]

COMPOSITION AND PREPARATION OF TREATING SOLUTION———A treating solution was composed of the following:

15.7% APO
17.3% THPC
4.3% Triethanolamine
0.2% Triton X-100[2], an alkylarylpolyether alcohol
62.5% water.

The solution was prepared by adding the measured quantity of THPC to one-half of the total amount of cold water with rapid stirring until completely dissolved. To this solution the triethanolamine was added with continued stirring. This combination is designated as solution A. The APO was then added, with rapid stirring, to the remainder of the cold water and designated as solution B. Just prior to treatment of the fabrics, the two solutions A and B were thoroughly mixed and the wetting agent Triton X-100 was added. This gave a solution of 33% solids, based on APO and THPC in an equimolar ratio, of pH 6.6. [See Section B of Discussion.]

*Padding.* The 40-inch-wide, 8.5-oz OD sateen was padded through the above solution using two dips and two nips with a squeeze-roll pressure of ten tons and batched with a minimum amount of tension. A wet pickup of 70% was obtained. [See Section C of Discussion.]

*Drying.* The fabric was dried in a forced-air, roller-type drying oven for 5.5 minutes at a temperature of 185°F. [See Section D of Discussion.]

*Curing.* The fabric was cured for five minutes at 290°F in the same oven used for drying. [See Section E of Discussion.]

*Washing and Drying.* The fabric was washed in a winch for a total of 30 minutes, with the water being changed every five minutes. Initial and final cycles were made in cold water, the other cycles being hot water washes at 140°F. The first hot-water wash cycle contained 0.1% Duponol LS Paste, a long-chain alcohol sulfate. Following the final wash, the wet fabric was passed through squeeze rolls and then dried on a tenter frame. [See Section F of Discussion.]

*Softening.* The dry fabric was softened with a 4% solution of a cationic softener by padding to a 50% wet pickup using one dip and one nip and redried on the tenter frame. The softener used in the processing of this fabric was Triton X-400, a tetraalkylammonium halide. [See Sections G and H of Discussion.]

In addition to the above fabric, 100 yards of the same 8.5-oz OD sateen was processed through a solution containing 26% APO-THPC solids using the same processing conditions and procedure.

PROPERTIES OF TREATED FABRIC———The fabric, processed with 33% total solids APO-THPC, contained approximately 15% resin add-on, and withstood repeated launderings and drycleanings. Char length in the standard vertical flame test was 2.7 inches with no after flame (Fed Spec CCC-T-1916, No. 5902), and was 2.9 inches after 15 launderings using a fluoride sour (Fed Spec CCC-T-1916, No. 5556). The samples would also pass the 180° strip angle flame test (3) before and after washing. The treated fabric, after softening, retained about 90% of its original warp breaking strength. After 15 launderings the tearing strength of the treated fabric containing 10% resin add-on was better than that of the untreated control. The fabric strength was not harmed by a chlorine bleach. Some crease resistance was imparted by the treatment. The flex abrasion of the treated fabric, after washing, was better than that of the untreated fabric. Comparable properties were obtained with a 10% resin add-on from processing with the 26% solution. Properties of the fabric are presented in Table I.

FUNCTIONS OF THE VARIOUS COMPONENTS OF THE SOLUTION———

*APO.* This compound furnishes phosphorus and nitrogen for imparting flame resistance by reacting with THPC to form an insoluble highly cross-linked, thermosetting resin. It also combines chemically with the cellulosic fiber, which probably accounts for the exceptional durability of the finish to acid and alkali washings. APO is usually shipped as an 85% solution containing a stabilizer. Various stabilizers such as ethyl alcohol, dehydrating substances such as phosphorus pentoxide, anhydrous sodium sulfate and others have been reported recently (4, 5).

*THPC.* This compound also serves a two-fold purpose. It furnishes some of the necessary phosphorus for imparting flame resistance to the fabric by forming an insoluble highly crosslinked condensation polymer with the APO. It also acts as a latent acid catalyst, liberating HCl along with formaldehyde, and tris(hydroxymethyl)phosphine oxide during the polymerization. THPC is a hygroscopic compound, but is stable at room temperature.

*Triethanolamine (TEA).* This is used to stabilize the resin-forming solution, acts as an acid acceptor during the curing process, and reduces any acid tendering. At room temperature, treating solutions from which triethanolamine is omitted will polymerize to a viscous liquid in several hours. Use of this viscous solution results in surface deposition of the polymer and imparts stiffness to the fabric. A preferred range of triethanolamine concentration is equivalent to about ¼ of the THPC concentration by weight.

*Wetting Agents.* A wetting agent is used to aid in uniform penetration and wetting of the fabric with the treating solution.

[2]The mention of trade products and firms does not imply their endorsement by the U S Department of Agriculture over similar products of firms not mentioned.

TABLE I

Properties of APO-THPC-treated 8.5-oz OD sateen

| Test | | Untreated control* Number of launderings 0 | 5 | 15 | APO-THPC-treated fabric — 10% Add-on Number of launderings 0 | 5 | 15 | 15% Add-on Number of launderings 0 | 5 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Thread count | W | 87.0 | 86.6 | 87.1 | 86.4 | 88.4 | 88.4 | 86.2 | 88.4 | 89.6 |
| | F | 56.0 | 57.0 | 58.6 | 54.6 | 57.2 | 59.0 | 54.4 | 56.2 | 59.6 |
| Width (in) | | 39.3 | — | 40.0 | 40.1 | — | 39.3 | 40.1 | — | 38.8 |
| Weight (oz/yd²) | | 9.0 | — | 8.8 | 9.65 | — | 10.42 | 9.96 | — | 11.2 |
| Thickness (in) | | 0.0248 | 0.0212 | 0.0211 | 0.0190 | 0.0211 | 0.0232 | 0.0190 | 0.0227 | 0.0250 |
| Stiffness (bending moment × 10⁴ in lbs) | W | 13.5 | 6.8 | 13.8 | 14.2 | 11.6 | 14.2 | 36.6 | 9.0 | 15.5 |
| | F | 12.0 | 6.7 | 13.4 | 18.8 | 7.4 | 11.9 | 16.3 | 7.0 | 15.0 |
| Char length (in) | | — | — | — | 2.97 | 3.68 | 4.12 | 2.65 | 2.77 | 2.87 |
| % N | | — | — | — | 1.63 | 1.50 | 1.31 | 2.12 | 2.04 | 1.95 |
| % P | | — | — | — | 1.40 | 1.20 | 0.91 | 1.76 | 1.87 | 1.39 |
| Strip breaking strength (lbs) | W | 134.0 | 120.8 | 125.5 | 123.2 | 115.0 | 107.4 | 113.6 | 96.2 | 92.6 |
| | F | 118.6 | 100.0 | 115.2 | 97.0 | 86.2 | 96.6 | 88.6 | 97.2 | 99.0 |
| | W | 11.6 | 13.2 | 13.5 | 7.9 | 11.3 | 13.5 | 6.3 | 7.8 | 19.9 |
| Elongation (%) | F | 21.8 | 19.3 | 20.0 | 20.7 | 19.7 | 21.7 | 20.9 | 19.3 | 12.2 |
| Abrasion resistance (flex) | W | 1856 | 443 | 228 | 1109 | 1263 | 1027 | 482 | 654 | 704 |
| | F | 2267 | 752 | 393 | 2252 | 1513 | 1416 | 1062 | 928 | 1048 |
| Elmendorf tear (lbs) | W | 14.8 | 8.3 | 6.2 | 10.6 | 8.4 | 8.6 | 8.8 | 7.1 | 6.9 |
| | F | 20.9 | 10.1 | 7.9 | 11.7 | 9.5 | 10.2 | 9.1 | 7.5 | 6.8 |
| Tongue tear (lbs) | W | 15.0 | 7.4 | 6.2 | 8.2 | 7.1 | 7.6 | 7.7 | 6.1 | 6.2 |
| | F | 15.9 | 9.5 | 8.6 | 10.8 | 8.1 | 8.9 | 8.8 | 7.8 | 8.4 |
| Crease resistance (Monsanto W+F) | | 229 | 210 | 225 | 270 | 237 | 243 | 275 | 250 | 246 |
| Breaking Strength† (lbs) after chlorine bleach | W | 118.5 | 134.5 | — | 102.4 | 123.4 | — | 97.4 | 100.6 | — |
| Chlorine bleach + scorch | W | 127.0 | 127.9 | — | 101.8 | 112.4 | — | 101.2 | 105.8 | — |

*Fabric rinsed one time in hot water and frame dried.
†AATCC Tentative Test Method 92-1958.

*Softeners.* Softeners usually improve the hand and tearing strength of the fabrics. There are a large number which are commercially available and can be used with good results.

COMMERCIAL APPLICATION———Very often a new finish can be applied successfully to a fabric under strictly controlled laboratory conditions, but for various reasons, the exact laboratory procedures cannot be duplicated when the processing procedures are scaled up to plant size. Therefore, it is necessary for the finisher to make changes in the process in order to find the optimum procedure and conditions suitable for producing a fabric with the desired properties by use of existing equipment. The APO-THPC flame-retardant treatment is very flexible in this respect.

Cooperation has been very close with industry in the application of the APO-THPC finish to fabrics and plant runs at various mills have been very successful in duplicating pilot-plant results, athough in most cases modifications had to be made in the processing procedures. Details for one of these mill runs are described below.

*Fabric Description.* Approximately 220 yards of 10-oz/yd² 32 inches wide, 54 × 54 army duck were finished with the APO-THPC flame retardant.

*Procedure.* The pad formulation was based on 50 gallons of treating solution using a one to one mole ratio of APO to THPC and containing a 33% total solids content, total solids being based on the APO and THPC only. The formulation contained the chemicals listed below:

18.5% Imine IP, an 85% commercial solution of APO.
17.3% THPC
4.3% TEA
0.5% Triton X-100
59.4% water[3]

[3]15 lbs of the total amount of water was cracked ice. The solution formed was pH 6.0.

The THPC was dissolved in about one-half of the required amount of water, the TEA added and thoroughly mixed. The remaining water and ice was added to the above solution then the Imine IP was added, with stirring. All mixing was done in a large mixing tank. To this solution was added the Triton X-100 wetting agent and the solution allowed to flow, by gravity, to the pad box. The temperature of the treating solution at this stage was below 70°F. The above solution was mixed just prior to use.

Padding was accomplished by using two padders. One, which contained the treating solution in the pad box, was a lever-set, gravity-fed padder with two rubber rolls, 50 inches wide, one hard and one soft. A five-ton pressure was maintained between rolls. The second padder was a microset pad with one hard rubber roll and one metal roll, each 50 inches wide. A 15-ton squeeze roll pressure was maintained.

The fabrics were padded through the solution with one dip and one nip with the first padder and one nip with second padder, at a rate of 42 yds per minute. Wet pickup of the duck fabric was determined prior to the actual run by passing a weighed piece of fabric through the bath and pad rolls. Wet pickup was 58%. The fabris was skied, passed between two pairs of opposed gas-fired infrared burners for preheating, then passed to an enclosed 70-foot tenter frame with an inlet temperature of about 195-198°F and an exit temperature of about 210°F. Elapsed time on the frame was one minute and 40 seconds. After passing through the frame, the fabric was cured in a gas-fired, roller-type curing oven (80 yds capacity) for three minutes at 345°F. These operations were carried out with a minimum amount of tension on the fabric.

After curing, the flame-resistant fabric was washed in an open, six-compartment continuous washing range. The number one compartment contained 0.25% soda ash in the water and the other compartments contained only hot water. The water temperature was maintained at approximately 140°F. Washing time was approximately one minute.

After washing, the fabric was dried over steam cans

TABLE II
Properties of army duck fabric commercially treated with APO-THPC

| Test | Untreated | — APO-THPC-treated — Commercially | SURDD |
|---|---|---|---|
| Width (in) | 32¼ | 31¼ | — |
| Thread count | 53 × 43 | 56 × 40 | — |
| Weight, oz/yd² | 10.1 | 10.9 | — |
| Elmendorf tear* (w) lb | 9.3 | 6.3 | 6.4 |
| After-flame (sec) | — | 0 | 0 |
| Afterglow (sec) | — | 1 | 0 |
| Char length (in) | — | 3.2 | 2.8 |
| Char length (in) after three-hour soap-soda boil | | 3.3 | 2.7 |
| Breaking strength (in break) lbs (w) | 124.6 | 102.4 | 117.0 |

*Application of a softener to the treated sample would increase the tearing strength making it about comparable to the untreated fabric.

(25 psig steam). Drying time was approximately two minutes.

Test results of this run are shown in Table II, along with some results obtained on the identical fabric processed with APO-THPC at the Southern Utilization Research and Development Division.

It is apparent from analyses shown in Table II that the APO-THPC process is adaptable for use in finishing fabric on commercial equipment. Without the addition of a softener, the tearing strength loss was approximately 30%. Tearing strength values would have been about comparable to the control fabric if a softener had been applied to the treated fabric. There was a loss of approximately 17% in the breaking strength of the commercially treated fabrics compared with approximately 7% for the pilot-plant sample. The flame resistance, durability of the finish, hand and other properties of the commercially finished fabric were similar to those of the sample prepared in the laboratory.

Other mills have successfully applied this APO-THPC flame-retardant finish to other fabrics and have found this flame retardant to be outstanding (*6, 7*).

Treatment of 8.5-oz OD sateen fabric with APO-THPC to a resin add-on of about 10%, which is needed to impart the required degree of flame resistance, has been estimated to cost about 28.6 cents per pound of product, based on a projected price of 70 cents per pound for THPC and $2.25 per pound for APO. Using a projected APO price of $1.00 per pound, the finishing cost would be 16.9 cents per pound of product (*8*).

## DISCUSSION

A) FABRIC PREPARATION———The fabric to be treated must be clean and preferably absorbent. It should be essentially free of any of the ordinary sizing materials, also alkalies which may have been used during wet processing of the fabric (such as in scouring, mercerizing, bleaching, dyeing, etc) must be thoroughly neutralized and rinsed out.

Starches, which are left in the fabric from improper desizing, interfere with the penetration of the reactant into the cellulose fiber. This causes increased stiffness and could possibly decrease the washfastness of the finish. Excellent results are always obtained when the fabrics are thoroughly desized before application of the APO-THPC flame retardant. Grey fabrics can be processed with the use of a good wetting agent, such as Triton X-100, to assist penetration.

Whenever possible, fabrics should be dried on a tenter frame before resin treatment. This makes the fabric more absorbent and produces a balanced crimp distribution. Fabrics should also be allowed to condition between drying and resin treatment. It has been found that dry fabrics which are still warm when stored in boxes or in tight rolls on padding can exhibit non-uniform absorbing tendencies and increase the temperature of the flame-retardant solution.

B) APO-THPC TREATING SOLUTIONS———The APO-THPC flameproofing solution will gradually become warm upon standing due to the heat of solution and to heat from some polymerization initiated by the rise in temperature. It is therefore necessary to keep the solution cool. This can be done in various ways. Substitution of ice for a portion of the required water has been found very satisfactory for small quantities of solution. Once the solution has been prepared, ice cannot be added since it will dilute the solution to a lower solids content. For obvious reasons, at no time must any heat be applied to aid solution of the chemicals.

C) PADDING———Fabric can be processed on either a continuous or batch-wise basis. In either case the fabric is padded through the resin-forming solution, dried, cured, washed, softened, and dried.

A commerical padder in good repair, equipped with a constant level control pad box and a combination of metal to rubber squeeze rolls, and adjustable in pressure up to 10 tons is recommended. The constant level control pad box insures that all portions of the fabric have the same immersion time. The high-pressure squeeze rolls provide a deep uniform penetration of the solution into the fibers and eliminate surplus treating liquor from the fiber interstices. If the resin-forming solution does not penetrate to the interior of the fiber and an excessive amount of material remains between the fibers, the treated fabric will be inferior because of the greater stiffness and losses in tearing strength and abrasion resistance. In general the fabric will receive a more uniform application if it is padded through the resin-forming solution twice using about a 10-ton squeeze-roll pressure on the rolls each time. (Hard rubber rolls can be substituted for the rubber to metal rolls providing a squeeze-roll pressure of ten tons or greater is used). Incorporation of a wetting agent is highly desirable.

The wet pickup obtained will depend on the squeeze roll pressure, hardness of the rolls, and the fabric weight and structure. It is suggested that mill trials be preceded by laboratory application to the particular fabric to be processed so that the necessary resin add-on required to impart adequate flame resistance can be determined. The finisher may find from these laboratory experiments that adequate flame resistance can be obtained with lower resin add-ons on fabrics designed for a particular end use. Use of lower resin add-ons will also lower the cost of the finish. Preliminary laboratory examination may also make the difference in the success or failure of the treatment. Once the solution concentration has been established for any particular fabric, this laboratory work will not have to be repeated. When the solution concentration has been established it is essential that a correlation be made between the wet pickup obtained on the laboratory versus the wet pickup obtained on the mill padder so that a corresponding adjustment can be made in the solids content. Very often this correlation is forgotten and such an omission may be the cause for an otherwise successful run to result in failure if there is a large difference in the wet pickups obtained with the two padders.

If after processing a given fabric with APO-THPC it is found that an additional resin add-on is required,

the amount of resin should not be varied by merely decreasing the nip on the squeeze rolls. This should be done by decreasing the amount of water used in preparing the solution to vary proportionally the concentration of all reactants in the treating solution. As stated previously, the amount of resin needed to impart the desired flame resistance will depend on the fabric weight, construction, and end use of the fabric.

D) DRYING———Drying is probably the most critical operation on this process. To prevent migration of the solution and stiffening of the treated fabrics, the least amount of tension possible should be applied to the fabric as it comes from the pad and the fabric should be dried as soon as possible at the preferred temperature of 185°F. Drying above 212°F will cause migration and surface curing before the inside of the yarn is dry. This imparts stiffness, and lower tearing strengths to the fabric. Where low resin add-ons are required, the drying is less critical.

In addition to high-temperature drying, high air velocity will also promote migration and produce results equivalent to those mentioned above. The optimum production speed consistent with good resin performance has to be determined for the various fabrics. Preheating devices, such as infrared units, are useful for bringing the wet fabric up to the drying temperature. The drying time will depend on the type of fiber, fabric weight and construction, rate of exchange of air, humidity in the drying oven and also on the capacity of the drying oven. The fabric must be dry before entering the curing oven; however, based on the results of recent preliminary investigations, a means of reducing the overall processing time through use of a one-step dry-cure operation may be possible. Results of these findings will be published at a later date.

Best fabric properties have always been obtained when forced-air roller-type drying ovens were used. Can drying should never be used for drying fabrics wetted with APO-THPC treating solution because of the excessive amount of migration which it causes. As a general rule, frame drying is not as satisfactory as the roller-type oven.

It is recommended that both the drying and curing ovens be well ventilated since the possible toxicity of the fumes evolved during these operations has not been investigated at this laboratory. During the years of our work with this process, we have had no trouble along these lines.

E) CURING———After drying, it is recommended that the fabric be run directly into the curing oven in a tandem operation so that the processing continues without interruption.

The practicality of this will depend upon the layout of the finishing plant. In some cases the fabric may have to be plaited into a box or batched on a shell after drying and then transported to the curing oven. If batching before curing is necessary, the fabric should be cooled by "skying," by running over chilled rolls, or by equivalent methods to prevent initiating polymerization of the resin-forming monomers by the residual heat in the fabric. If the fabric is batched while hot and allowed to stand for a period of time, the exothermic heat produced by continued polymerization, which cannot be easily dissipated, will increase progressively and can result in the eventual charring of the fabric. This, of course, would not be a problem in a tandem operation where there is little time lag between drying and curing.

The specific curing times needed in any given case will depend upon the curing temperature used, the weight and construction of the fabric, the temperature of the fabric as it enters the curing oven, humidity in the oven, and the capacity of the oven.

A short cure time requires a higher curing temperature and vice-versa. For example, an 8.5-oz OD sateen fabric is adequately cured in four to five minutes at 285°F, but by increasing the cure temperature to 325°-330°F the cure time can be reduced to three minutes.

Adequate curing is essential in all cases to insure maximum durability and efficiency. Tests must be run in the individual mills using existing equipment in order to determine the optimum conditions necessary for obtaining an adequate cure.

Following the cure operation, the hot fabric should be washed immediately.

F) WASHING———The washing operation is desirable because it removes unfixed resin and salts, thus eliminating the possibility of odor problems, and generally improves the hand of the treated fabric.

Washing can be done satisfactorily on a winch, jig, continuous open-width soaper, or any other conventional washing apparatus. Fabrics finished in the laboratory with APO-THPC have shown no signs of crocking regardless of the washing method used. If the continuous open-width soaper is used for washing the fabric, the first box should contain a detergent and the remaining boxes water. All washing should be carried out at a temperature of approximately 140°F. The time and conditions of washing required for particular fabrics should be established by trial in each case. In our experimental work, duration of washing was longer than necessary.

The final drying of the fabric can be done satisfactorily using any conventional drying method.

G) SOFTENING———It is common practice to add a softener to the resin formulation or as an aftertreatment, either for its effect of improving the hand of the fabric or for improving and maintaining the tearing strength. Softeners and a number of water repellents may be applied to APO-THPC-treated fabric as an aftertreatment or may be incorporated into the resin-forming solution for application in one padding, drying, and curing operation. Good results have been obtained by application of the softener to the fabric from the last rinse water. Best results are usually obtained if the softener is applied as an aftertreatment.

Choice of softeners should be made with care. The one selected should have some durability to repeated washings, should not yellow with curing, should not cause chlorine retention, and should not reduce the bath stability if used in the APO-THPC treating solution. Softeners which are substantive to or react with cotton are recommended.

H) DRY FINISHING———After drying, the fabric can be given any desired dry finishing operation, such as compressive shrinking or calendering. These latter operations usually improve the handle of the fabric and may be applied if a slightly stiffened fabric is obtained due to improper finishing (drying and curing) or to excessive resin add-on.

## SUMMARY

A new highly durable flame-retardant finish for fabrics has been developed which consists of treating fab-

ric with the readily available phosphorus-containing chemicals APO and THPC. The treatment consists of padding fabric through an aqueous solution of APO-THPC, then drying at a relatively low temperature, curing at an elevated temperature, to form a highly crosslinked resin inside the fiber, followed by washing, drying, and softening.

The APO-THPC flame-retardant process can be readily applied to cotton using commerical equipment to obtain properties equivalent to those obtained when fabrics are processed in the pilot plant. Commercial processing by various finishers necessitated some modifications in the laboratory technique in order to be applicable on existing equipment.

Important processing points are:

1) Keep APO-THPC treating solution cool and mix just prior to treatment of fabric.

2) Treat fabric in tandem operation with minimum amount of tension.

3) Pad fabric through the treating solution using two dips and two nips with high squeeze-roll pressure.

4) Dry the fabric in a forced-air roller-type oven at a temperature of approximately 185°F until dry.

5) Cure the fabric at or above 285°F for times sufficient for adequate cure.

6) Wash using standard procedures.

7) Apply softener as an aftertreatment.

This new flame retardant appears to meet all of the many requirements for a generally satisfactory flame retardant.

## ACKNOWLEDGMENT

The authors wish to express their appreciation to Janice M Evans, Julia M Sloan and Margarette Laughlin for the textile evaluation tests, to Paul J Murphy and Julian J Jurgens for phosphorus and nitrogen determinations.

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# ADR ABSTRACTS

## Principles of Padding

Peel, R A, *Dyer 124*, 95-6 July 15, 1960

Pads and pad dyeing are not new, but the pad as a machine has been greatly improved in modern times. Still, the principles of pad dyeing remain the same, whether for direct, pigment or reactive dyes.

There are six basic rules which must be observed, according to the author:

1) The pad nips must be protected by a safety bar.

2) After use, even for a short break, the pressure or weight must be taken off the bowls, and the bowls cleaned down.

3) The bowls should be checked regularly for wear by a simple carbon paper/white paper pressure test.

4) Maintenance and lubrication must be done weekly and rust in moving parts eliminated.

5) Knots, heavy seams and foreign objects must be kept out of the nip.

6) The speed, pressure, temperature and volume (ie, feed control) of the bath must be recorded for every job.

The bowls used in dyehouse mangles are now usually of rubber and vulcanite or rubber and brass. Some are of the two-bowl type, the bottom bowl of vulcanite and the top one of rubber. This gives a single-nip squeeze only. Others are of the three-bowl type, the top and bottom ones usually of vulcanite and the middle one of rubber. This permits a double immersion in the pad liquor, and gives better penetration. With either type, the vulcanite (or brass) bowl should be the driven one.

The author describes several ways of applying pressure to a pad. The use of levers and weights is an earlier type and is quite efficient if properly handled. The "dead-set" type, in which the pressure is applied by a screw and hand-wheel, is seldom used, as the nip is too unyielding. The modern type of loading is by pneumatic pressure, using compressed air. This method gives a very "springy" or elastic pressure.

The "essential and vital" part of the mangle is the bowls. If the shade produced is darker on the sides than in the center, this is due to the bowls not having the right "camber" (slight convexity of the surface). The correct camber can only be found by trials; it depends on the width and diameter of the bowl and the pressure applied.

The author refers to several recent journal articles on padding which will be found useful.

●

## Resins for Wash-wear Finishes

Borghetty, H C, *Textile Recorder 78*, 56-7, 59, August, 1960

Polyester fibers (eg, Dacron) stand "at the head of the list" of hydrophobic fibers, according to the author, for "minimum-care" garments. Orlon, Acrilan and other acrylics also stand high, and the triacetate fiber Arnel has now entered the picture. The thermoplastic properties of these fibers usually permit them to shed wrinkles without the use of chemical finishes.

The use of cotton in the white "wash-wear" shirting field has been so successful that it now surpasses in volume all other "wash-wear" fabrics, the author states.

The resins used for imparting wrinkle resistance and "wash-wear" properties to cotton dress goods are all of the thermosetting type, requiring a catalyst, a high-temperature cure and preferably an afterwash. The most important initial contribution to resin finishing was given by the introduction of chemico-mechanical techniques such as embossing and Everglaze. The resins used for these fabrics were either urea- or melamine-formaldehyde and later ethylene urea derivatives. The latter quickly found acceptance for straight crease-resistant finishes and because of their good resistance to household chlorination they quickly supplanted the former types.

The need for finishes that could withstand the rigors of commercial laundering led to the introduction of

(*continued on page 55*)

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February 20, 1961 No. 4

*1960 National Convention———*

# FABRIC DEVELOPMENT FROM A PRACTICAL DYER'S STANDPOINT*

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DESIGNING, dyeing-finishing and merchandising fabrics of man-made fibers is really a new business. The synthetic fiber business has taken a giant step forward in the last 15 years, with the advent of the acrylics, the polyesters and the nylons. The new fibers—acrylics, polyesters and nylons—have come into being since World War II—1946. Synthetic textiles is a new industry that is being built upon the structures and older ideas, methods and merchandising of the older textile industry. By these older structures, I mean the textile industry of the 100% cotton or 100% wool and worsteds.

It is paradoxical that this synthetics fabrics industry, which has grown by 2000% in the last 10 years, is itself having a difficult time in surviving its own revolution. It is this same synthetics business that is bringing the best of chemistry to industry and giving the public a better fabric, a longer-lasting garment, at a lower price than 10 years ago. Yet the synthetics fabric industry is almost the victim of its own inventions and technology and merchandising methods.

Let's cite an example of this improved quality fabric being offered the public at a lower price than ever:

Ten years ago automotive body cloth—upholstery fabric—was mostly all-wool constructions in a narrow range of dull shades of grays, tans, browns and black and white. Many of the shades had perhaps 20 hours lightfastness at the most. The wool fabrics had low wear resistance, consequently everyone who bought a new car almost immediately put on seat covers to protect the new upholstery. This cloth sold for about $8.00 per yard for the better qualities. Today, as you know, the synthetics industry is producing nylon-faced auto fabrics that are far more durable than the earlier fabrics; the fastness to light is several times better. It is 80 to 100 hours with an on-tone fade. Seat covers are no longer needed. A wide variety of shades are offered. Now as to price, this superior fabric sells for half-price—say $4.00 per yard.

Now from the viewpoint of a dyer, let us look at this synthetic business and see how fabric development of a synthetic fabric fits in and affects us. By this term "dyer", I mean dyehouse—the finishing plant that converts greige goods into a dyed, finished fabric, whether it be piece goods, circular knit, tricot, jig-dyed taffetas, or a suiting of Dacron/cotton warp with an Orlon/wool filling.

Making a fabric of synthetic fibers and successfully merchandising it is quite different from that of the regular all-cotton or all-woolen business. Actually, the difference between the synthetics business and the 100%-cotton or woolen business is much greater than ever imagined by most textile people. This difference exists all along the line, from fabric development, dyeing and finishing, down through your New York merchandising. The axioms and policies of manufacturing and merchandizing that are tried and true in regular textile business may lead your dyehouse to near disaster if applied to this new synthetics business. We shall point out some of these differences as we proceed to look at fabric development of synthetics and how it affects us as dyers.

Fabric development of synthetic mixtures is a complicated affair which, if not understood by people involved all along the line—from designer to New York, will result in your plant losing money, even to the point of going bankrupt. Now, it is easy to oversimplify the dyeing and marketing situation in synthetics, and to underestimate the problems connected with synthetic blends.

Let us say right off, the object of fabric development of any textile is to produce a profit for your plant, your dyehouse, or your company if it is an integrated organization. We must show a reasonable profit on our work if we are to survive. Designing of synthetic fibers is complicated; manufacturing of the synthetic fabric is complicated; dyeing and finishing is complicated. However, the most complicated part of all in synthetics is cost accounting—trying to determine what it has cost to produce and dye the fabric—include all the incidental factors—redyes—that add to these costs, and to merchandise this at a reasonable profit. This point about knowing your costs so you can sell at a reasonable profit, and not at a loss, is the most important essential in any successful synthetics program.

In designing or developing a fabric, the first question is what type of fibers can be used in making a successful fabric. The end-use, fastness requirements, styling and market situation determine the type of fibers that can be used in a fabric. Most new synthetic fabrics today have been evolved from older, established styles. One new blend that is successful leads to another—which may or may not be successful. There has been a great change in fabric development and designing in the past

*Presented October 7, 1960 at the 1960 AATCC Convention held at the Sheraton Hotel, Philadelphia, Pa

three or four years. No longer does a designer sit down to design a new fabric and simply start out with two or three new synthetic fibers and try to decide which fibers to dye, what yarns to make, what kind of fabric can be made. This was done three or four years ago, but not today. The designer today begins with yarn mixtures he already has on hand, or a style that is already in production, and he adds to this. He will take a basic fabric—say a Dacron/rayon slacks fabric that has run well for the past few seasons, and add to it a decoration yarn—something to make it more appealing.

Let me give an illustration of fabric development. What yarn would you use as a decoration to add to a Dacron/rayon that is to be piece dyed? Would you use Orlon, or a predyed Dacron, or vat-predyed cotton? Acrilan 135, or acetate or silk? Zefran? Kodel? Fortrel? Which fiber? And, would you have it predyed or would you dye it in the piece? It makes a great deal of difference to you as a dyer—your dyehouse—which fiber is used. It makes a real difference to the dyehouse. The difference is in your costs—what you get for dyeing the fabric. It makes a difference to your dyehouse whether you are a commission dyer selling your services as a dyer, and you have been dyeing the plain fabric; or whether yours is a dyehouse in a vertical company selling finished goods. Either way, the question remains the same—what fiber to use as the decoration, and who will pay for the dyeing? Can the converter sell cloth for more money? There is no such thing in this world as a free meal. Somebody must pay. There is no such thing as a free dyeing. So it is important that your mill management and your New York sales office see that your plant gets paid for your dyeing—even if it is just dyeing a decoration yarn.

We say this point about costs is more important to your dyehouse than the question of which fiber should the designer use. Just to answer the question about which decoration yarn to use in the Dacron/rayon, we would say: use predyed Orlon or Acrilan 16, dyed with fast basics. The yarn would already be dyed—it would not add to the cost of the piece dyeing. That's why I would use the predyed acrylic. Otherwise, your dyehouse will be faced with trying to get more money for the dyeing.

How many styles? How many dark shades are running in your dyehouse now on which you are actually losing money—if you admit to your true, total costs? Is this because a decoration yarn has been added and your dyehouse is taking the business at the same price as the plain goods? What was a seemingly minor style change by the designer can seriously affect you as a dyer—as a dyehouse.

The most famous last words in synthetics dyehouses are "It pays part of my overhead".

Many mistakes in designing—in fabric development have been made in the past. For example—mixing two types of rayon and then trying to dye a union shade. You can do it, but it just adds to your costs. Mixing two types of nylon then trying to dye a union—when you get through you still have just a nylon fabric, at a higher cost. Another mistake that many of us have seen, is to have sample pieces made with one consstruction and the production comes in with slightly different construction. Some change was made in the yarns. Let me illustrate: Suppose your designer takes a regular rayon and acetate fabric—He adds to the rayon, a Bemberg rayon nub. This nub dyes deeper than the regular rayon. It makes an attractive fabric that customers like and yet it does not add much to overall cost. It sells well. Now your manufacturing plant—the greige mill—goes into production and decides to use up some regular rayon nubs they have on hand. Now when this regular rayon nubby fabric comes into the dyehouse, it dyes entirely different from the master sample which contained Bemberg nubs. The converter really becomes upset and says to the dyer, "You're killing me". The dyer, after a number of expensive redyes, finally realizes that this is not his fault. He realizes after he has spoiled another lot, that the nubs were changed. Then he has to try and prove this to the greige mill.

I don't have any good answer on how to solve this problem. This is just a simple example of how designing and fabric development of synthetics can get off the track. Designers, don't make your sample pieces one way and your production another way—no matter how simple the change may seem. Be sure that your manufacturing plant knows what effect any proposed change will have on the dyeing.

As we said before, this is a complicated business and everybody's mistakes come together in the dyehouse. You, as the dyer, own these mistakes. Learn to recognize them, their causes—and remember, these add to your own costs!

Now, back to this question of which fibers the designer should use and which fibers can be dyed or can be cross-dyed or left white. This is a big subject that can't be answered with any hard and fast rules. Almost any fiber combination you can name can be dyed somehow or other. No longer do you say one particular fiber combination can be dyed and some other combination can't be dyed. Some way or other most any reasonable fiber combination can be handled by the dyer. Somehow or other your lab—your chemist and dyer—can figure out how to dye the style. It may take them a while and a lot of lab dyeings to find out. Someone may even tell them how—or give them a good hint. But here again comes the all-important factor of costs—knowing what it costs to dye and finish this difficult mixture. If your dyehouse does not know its costs and if your New York office has taken the business at less than your actual costs, with no profit to you, then no one can help you, your plant in in real trouble—losing money.

It is important for the designer to know what fibers mixture is most practical from a total cost standpoint. It is just as important that your New York office know when not to take an order—when not to cut the price and try to get the dyer to make up the loss.

Seldom does cutting your price of dyeing, or cutting the price of the dyed goods, pick up enough business to offset the cut in profit.

The designer can learn which fiber mixtures are most practical, and which can be dyed, only by keeping close contact with his dyer. The designer must educate himself by this close contact. The dyehouse laboratory can dye small lab dyeings and show New York and the designer whether any particular fiber combination is practical or not. Then if your dyehouse knows the costs of this dyeing, you can help your New York office to establish a profitable price. If you can't make a profit, then don't take the business—no matter what you hear your competitor is doing. He may be going broke.

*Factors that add to costs:*

In knowing your costs, as a dyer, there are many incidental items and expenses that add to your costs. Often these are beyond your control. Greige mill dirt, dirty knots, wild end contamination, filling bands,

slack selvages. All these add up to rehandles—redyes. Redyes are a very real and very expensive item that must be admitted in your costs. Redyes result in lower production that automatically increases the overhead per yard. This complication of rehandles, redyes, high overhead, is a fact of life in a synthetics plant, and must be included in your costs—whereas redyes in other types of dyehouses, for example, may be low. In synthetics, we don't obtain the volume yardage for a shade that lets us really set up a streamlined, automatic dyeing system.

Now, in any successful synthetics fabric program, there are two other essentials: namely, competent personnel and adequate equipment. The dyehouse must have skill, knowledge and a staff with the experience of handling synthetics. They must have the enthusiasm or feel for handling synthetics. Your plant, to handle synthetics, needs the right kind of equipment for the particular fabrics. Shrinkage or contraction of the synthetic fibers during preparation for dyeing is a major feature of synthetics that must not be overlooked. Jig styles—flat taffetas—don't run well in becks. Beck styles, such as suitings, shirtings, crepes, don't run well on jigs. The yardage to dye per shade at one time in synthetics is always low—a few thousand yards per shade with an assortment of six to eight shades. This factor of short yardage works against having efficient continuous dyeing methods.

Another fact to always consider in thinking of synthetics is the effect of styling changes—changes in the styles—the fiber content or in the shades to be dyed. How will this affect your dyeing operation? You can dye an Arnel/cotton on the jig—dyeing the cotton only. If the styling changes and you are called on to dye the Arnel dark—say black—and the cotton light, this will require a complete change in processing and an entirely new set of costs. You can dye a small check pattern of Arnel/Fortel/cotton—you can heat set or stabilize the fabric on a hot tenter frame; but if the pattern is changed to a large check—this Arnel/Fortrel will pucker up due to differential shrinkage of the Arnel and Fortrel. Now, what are you going to do? You can't heat set on the tenter frame, neither can you heat set this on your roller curing oven. You will need another piece of equipment—a roller heat setting machine—$25,000. Before you get this paid for, the style will have changed again. All this is part of fabric development—how equipment relates to the types of fabrics you plan.

Fabric development is so tied in with the equipment you have available, you must not overlook this important point. Be sure you plan for this. Avoid taking styles you are not equipped to run. You will be in for some disappointments unless you do have the equipment.

One thing that stands out in this business of synthetics is how often you almost succeed. A beck-dyed style—a suiting, for example, has a good hand—a closed up, full faced appearance. Now try to pad dye it, and it feels thin—a bad feature called "see-through"—cloth too thin—not closed up enough. The goods did not shrink the necessary 12%-15% during processing in the beck. Consequently, by being pad dyed, it is thin—unattractive. You have a pad process that looks a little cheaper, but you don't have much of value since the customer does not like the hand. Cut the price of your dyeing to try and get business, and you have lost your advantage of pad dyeing.

So, be sure you have the people, the experience and the equipment, if your synthetics program is to succeed.

In conclusion, don't sell yourself short. As dyers dealing in synthetics, you are making a real contribution to better living for everyone; giving the public more for its money than ever before. Encourage your management to know your costs so that your plant can guide New York in to taking business at a profit and not at some near loss.

# PROPOSED AMENDMENT TO THE CONSTITUTION

ON November 17, 1960, A Henry Gaede, acting as the original proponent of a proposal to amend Article V, Section 2 of the Constitution, signed by 101 Senior Members for the stated purpose "To limit the term of service on the Council by reason of having served as President of the Association of future Past Presidents to the four years following retirement as President. Nothing in this proposal shall be construed as effecting those Past Presidents now serving on the Council nor shall it limit in any way the right of any Section to elect to the Council as a Sectional Councilor any Past President whose term on the Council by reason of having been President may have expired."

The proposal was presented at the 221st Council meeting for discussion and referred to the Committee on Constitution and Bylaws. Minor changes in the proposal were made by the Committee and approved by the Original Proponent, and the proposal submitted at the next following meeting of the Council on January 20, 1961. By a vote of 29 to 3, the Council approved the proposed amendment.

To further carry out the requirements for amending the Constitution as set forth in Article VIII, the proposal is herewith presented to the Senior members in the *Proceedings* of the Association. Accompanied by printed copy of this record of vote and statement, the proposal will be submitted to a vote of the entire Senior membership of the Association on ballots mailed with the next ballots issued for the election of officers of the Association.

Proposed amendment to Article V, Section 2: — Delete the words "the Past Presidents" and insert "each Past President whose term expired prior to December 31, 1960, and each subsequent Past President only for the four years following expiration of his term of office as President", ———.

*1960 National Convention———*

# ROVANA—VERSATILE NEW YARN*

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This paper reviews the physical and chemical properties of Rovana and discusses the types of finishing operations that are applicable to fabrics of Rovana. Embossing, dielectric sealing, latex and solvent system coatings are included. Coloration and printing of fabrics containing Rovana and Rovana combined with other fibers are discussed.

Visual and physical test data are presented to show the effect of a range of embossing temperatures and speeds on the clarity and durability of embossed combination fabrics of Rovana and rayon.

The dielectric sealing properties of Rovana and Rovana in combination with other yarns are discussed. Frequencies of 13.5, 18, and 27 megacycles were employed for this work.

Automotive fabrics, draperies, upholstery, wall covering, luggage, window shades, place mats and millinery are among the household and industrial applications in which the unique characteristics of Rovana are said to be effectively utilized.

## INTRODUCTION

TWO trends are apparent in today's development of textile fibers for tomorrow's fabrics: one of these is the finding of new chemical combinations that are suitable as fiber polymers; the other is the finding of new fiber geometries that improve the existing fiber properties.

Rovana[1] saran micro-tape was developed to take advantage of both of these concepts.

Chemically, it is a new copolymer of vinylidene chloride; structurally, it is a lightweight yarn with a width six to 10 times its thickness, depending on denier.

What is the significance of this combination? Specifically, 1) what properties does Rovana feature, and 2) how can these unique properties be effectively utilized?

One of the more significant properties of fabrics containing Rovana is that they are naturally lightweight due to the high covering power of this micro-tape type yarn. Figure 1 clearly shows this cross-sectional folded tape geometry as well as the micro-porous structure of Rovana.

Rovana saran micro-tape is a thermoplastic material having a softening range of 310-320°F and melting at 340-350°F. When softened, the flow properties of Rovana allow fabrics to be heat shaped, sealed thermally, and molded. In addition, it can be raised to its melting temperature by commonly used dielectric heat sealing frequencies; thus fabrics of Rovana possess the capability of being commercially dielectrically heat sealed.

The moisture regain of Rovana is less than one percent; however, even with this low regain, electrical charges rapidly dissipate resulting in less static than many other synthetic textiles.

The basic vinylidene chloride copolymer composition imparts excellent resistance to flammability—Rovana does not burn, will not support combustion and retards burning when properly combined with other yarns. This composition also results in high resistance to outdoor exposure, mildew, rot and to most commonly used chemicals with the exception of those that are strongly basic.

Special emphasis has been placed on the thermal and mechanical characteristics of Rovana, and rightly so, because of their importance to the finishing of fabrics containing Rovana. The following is an outline of the methods of coloration and the pertinent finishing operations that are used on fabrics of Rovana.

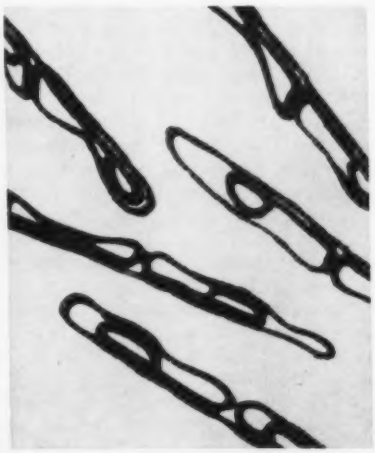

Figure 1

## COLORATION

A wide spectrum of solution-dyed colors, including white, are available, as shown in Figure 2. These new Rovana saran micro-tape colors have excellent fastness to light and weathering. The majority of these colors withstand Fade-Ometer exposure of 200 to 320 hours and Weather-Ometer exposure of 160 hours. Outdoor or direct weathering exposures, while not complete, are very good through 100 hours exposure. Laundering and drycleaning fastness of these colors are also excellent.

Tone-on-tone, union and cross-dyed styles are also possible when either white or pigmented Rovana is combined with other textile yarns. Direct, acid, or vat dyestuffs may be applied to other component(s) to obtain these effects. Selected dyestuffs ensure proper shade control and maximum light stability.

Normally, dyeing of white Rovana is not recommended. However, in those applications which do not require stringent lightfastness properties, disperse (acetate) or cationic dyestuffs may be employed. Build-up of these dyes is limited to medium shades with lightfastness of five to 15 hours.

PRINTING———As further illustrated in Figure 2, fabrics of Rovana may be printed with resin-bonded pigments, both water-in-oil and oil-in-water types, using reactive binders that can be cured at 200°F for five minutes. Colorfastness properties are similar to these pigments when applied on other textiles using these low-temperature curing systems.

*Presented October 7, 1960 during the 1960 AATCC Convention held at the Sheraton Hotel, Philadelphia, Pa.

[1]Rovana is a trademark of The Dow Chemical Company for products including saran micro-tape.

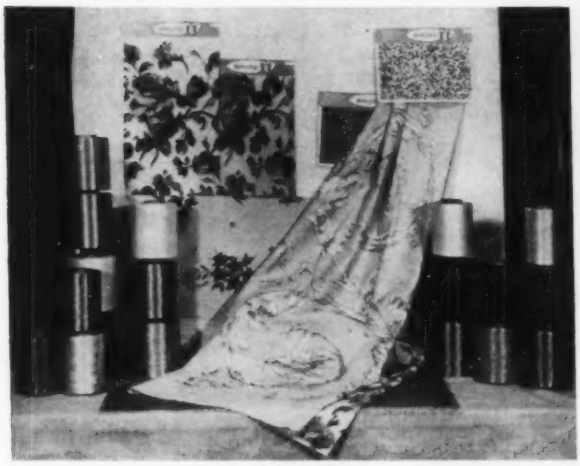

Figure 2

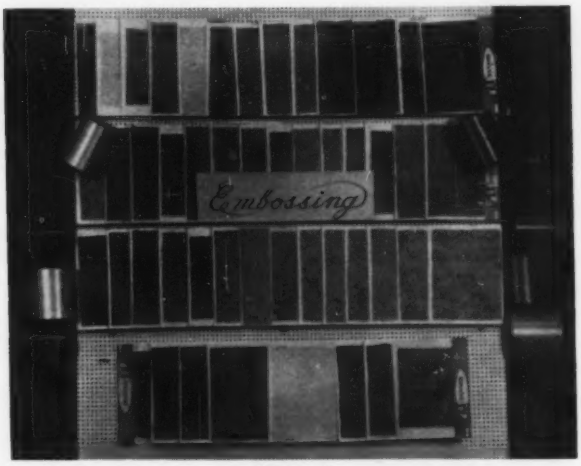


Figure 3

## FINISHING

For many applications, only minimum finishing is required for fabrics of Rovana saran micro-tape. Usually a framing operation at 225-250°F is recommended to relax strains developed during the warping and weaving operations. Semidecating may also be employed on combination fabrics to improve the hand or texture.

Coatings, laminating, calendering and embossing may be employed to provide additional functionality and styling.

COATINGS —— Coatings have been used effectively to improve abrasion resistance, to reduce yarn slippage, to stiffen and to dull fabrics containing Rovana. Aqueous and/or solvent systems of acrylics, polyvinyl acetate, polyvinyl alcohol and copolymers of vinyl and vinylidene chloride have been used.

These coatings have been applied commercially utilizing knife, spray, roll or immersion techniques. For example, seat cover fabrics containing Rovana and rayon have been back coated by both spray and roll techniques with acrylic latexes using normal application conditions. A second example is the application of polyvinyl acetate by normal immersion procedures to provide additional body and increase seam strength. Like other hydrophobic materials, the wet pickup of Rovana saran micro-tape should be determined and the coating solids in the mix adjusted accordingly.

LAMINATING —— Laminations are utilized where more effective barriers to the permeability of gases, liquids or solar radiation are required than those normally provided by coatings.

Synthetic rubber-base adhesives have been used to laminate fabrics of Rovana to vinyl film, rayon or cotton drill and polyurethane foam. The adhesive is knife or roller coated, on either or both materials, combined immediately and dried to evaporate solvent—the normal commercial application technique.

Fabrics of Rovana have been laminated to paper by hot bonding. Here an acrylic adhesive is coated on the paper, dried and laminated to the fabric at the heated combining rolls. Adequate bonds are obtained at speeds of 20 ft/min and roll temperature of 325°F.

Other adhesives ranging from common animal glue to specially formulated resins may be used as laminating adhesives.

HOT FORMING——The technique of hot-forming or heat shaping fabrics of Rovana saran micro-tape, both knitted and woven, is applicable where moderate draw ratios up to 40% are required.

Mold conditions of 300°F for 30 seconds have produced products of Rovana with good shape permanence. The mold should be preheated before inserting the fabric and, after molding, minimum handling is recommended until cool to prevent such distortions as the formation of wrinkles.

Fabrics of Rovana which have been hot-formed exhibit excellent crush resistance and shape retention.

EMBOSSING——Rovana can be embossed in both deep and shallow patterns. Novel color effects can be obtained in the embossed design when contrasting colors are used in the warp and the filling yarns. This color change is due to Rovana becoming more dense and transparent at embossing pressures and temperatures. Those sections of the underlying colored yarns that are normally hidden from view are now clearly visible: in effect the opaque yarn of Rovana saran micro-tape is transformed into a series of clear or colored window panes at the yarn crossover points within the embossed areas.

Figure 3 is a display of embossed fabrics, many of them showing this color change.

The clarity of an embossed pattern is greatly influenced by the temperature of embossing. To show this effect, the three fabrics outlined in Table I were woven and embossed at 250, 275, 300, 325 and 350°F as shown

TABLE I
Rovana/rayon fabrics
Weave: satin, four harness

| Fabric | Warp (white) 72 ends, 300 denier | Filling (black) 48 picks, 400-denier Rovana 450-denier rayon | % Rovana |
|---|---|---|---|
| A | Rovana | Rovana | 100 |
| B | Rovana | two picks Rovana/two picks rayon | 74 |
| C | One end Rovana/ one end rayon | two picks Rovana/two picks rayon | 49 |

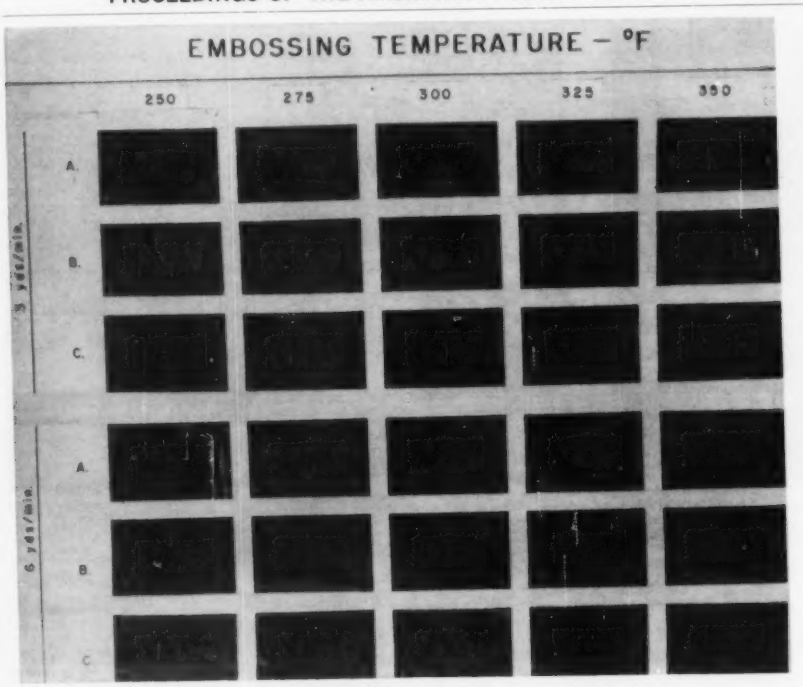


Figure 4

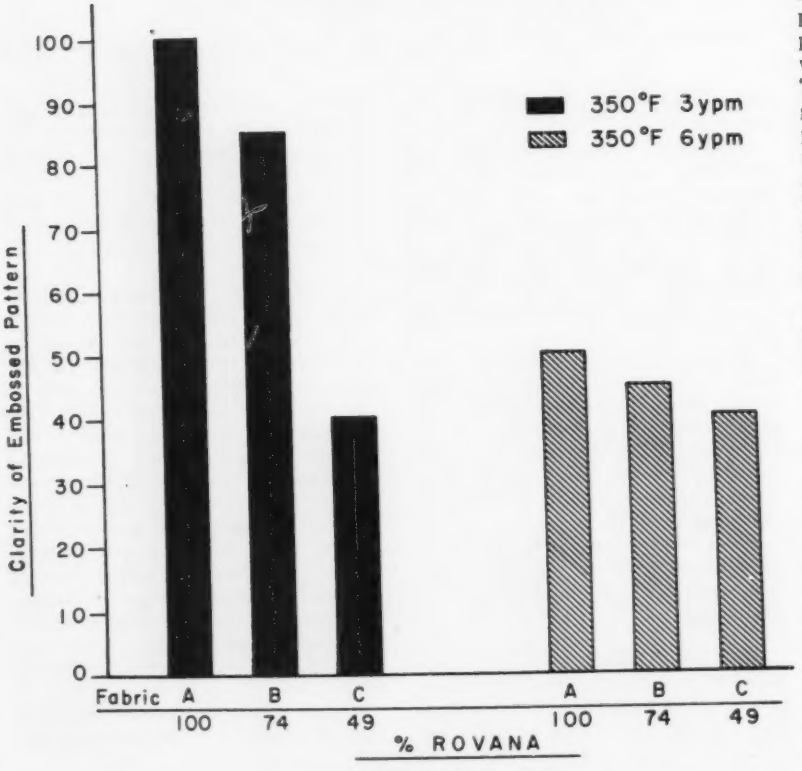


Figure 5

Embossing of Rovana/rayon

in Figure 4. The upper set of three was embossed at three yds/min, the lower set at six yds/min.

Note the increased clarity of pattern at the higher temperatures, at the lower speed, and as the percentage of Rovana in the fabric increased.

The effect of speed and percentage of Rovana is more clearly shown by the bar graph in Figure 5; here the three ypm, Fabric A sample was visually rated as 100 for this comparison.

The difference between the fabrics run at three and six ypm at 350°F was quite pronounced indicating that a definite time/temperature relationship exists—preheating the fabric would make higher speeds possible.

DIELECTRIC SEALING——Another characteristic of Rovana saran micro-tape is its ability to be dielectrically sealed. This inherent property offers increased efficiency and cost savings in many areas of fabrication. For example, the widespread use of dielectric seals in place of sewn seams in the assembly of automotive fabrics makes Rovana of particular interest to this industry. Textured fabrics that are breathable and have high tear strengths fulfill many automotive styling and engineering needs.

Figure 6 illustrates automotive door panels of Rovana. This particular assembly consists of 1) a center piece of 100% Rovana, 2) a nonwoven padding, and 3) a hard board backing with two trim sections of vinyl film. The door panels at the left and foreground of Figure 6 contain center pieces of Rovana in combination with rayon and nylon—illustrating style and fabric engineering potentials. These door panels were dielectrically sealed using a 10 kilowatt production sealer operating at 13.5 megacycles.

The following range of conditions gave the best results on the production press using a rule area of 55.6 square inches:

1.75 amps
10-12 seconds heat
15 seconds hold
450 pounds per square inch of rule area

Applications other than door panels will, of course, require their own set of conditions which are dependent on the material employed, rule area, thickness of material to be sealed, and frequency of the dielectric sealer. Fabrics of Rovana saran micro-tape have been sealed with good bond strengths to other fabrics containing Rovana, to vinyl, and to polyester trim materials at 13.5, 18 and 27 megacycles.

## SUMMARY

In summary, Rovana is a high coverage solution-dyed yarn that is nonflammable and is resistant to common

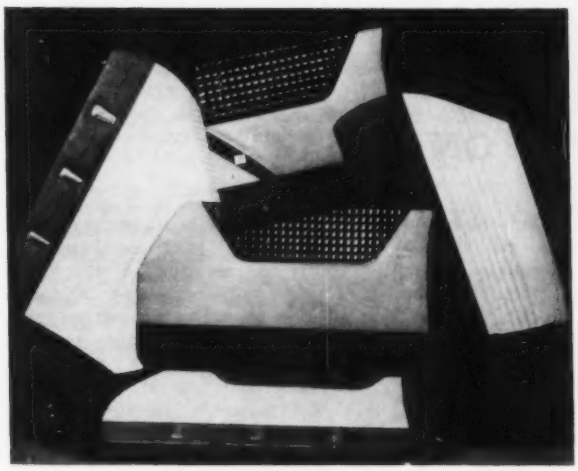

Figure 6

Figure 7

chemicals, weathering, rot and mildew. Fabrics containing Rovana can be coated, laminated, heat shaped, embossed to give multicolored effects, and can be dielectrically sealed.

The properties of Rovana lend themselves to wide usage, particularly in household and industrial applications (Figures 7 and 8).

Rovana saran micro-tape is truly a new yarn that can be woven into new fabrics and subsequently engineered to fulfill many of tomorrow's needs.

## WARRANTY

This information, based on our experience and commonly used testing methods, is believed to be accurate; however, no warranty is made and no responsibility is assumed regarding its merits nor is freedom of patent to be inferred. The reader is expected to confirm the information by independent experiments and it is not to be further disseminated without written permission of Dow.

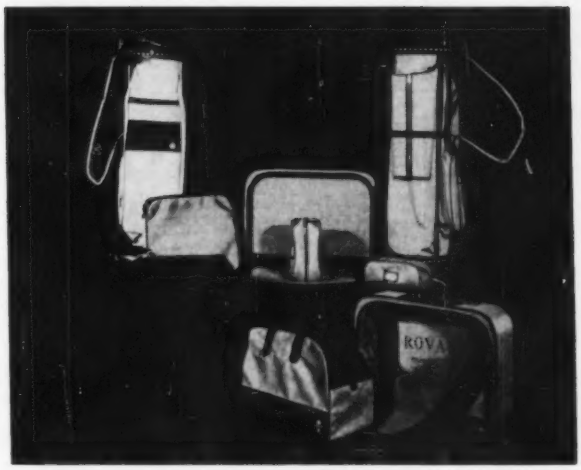


Figure 8

# Future Papers

THESE papers have been submitted for publication in future issues of the *Proceedings:*

"Construction Limits of Fabrics Containing Cresian Acrylic Fiber"—H C Haller, American Cyanamid Co

"Science and Craft in Color"—Panel

"Modern Continuous Dyeing Processes"—Richard Kern, Sandoz Ltd

"The Importance of Odor Control in Textile Processing"—Breckinridge K Tremaine, Rhodia, Inc

"A Study in Union Dyeing"—Northern New England Section

"Selection of Direct Dyestuffs for Application to Undesulfured Rayon Staple"—Southeastern Section

"Dyeing with Vinyl-Sulfone Reactive Dyes"—H Luttringhaus, Carbic-Hoechst Corp

"Status of Nonwoven Fabrics in the Textile Trade"—Howard W Shearer, American Viscose Corp

"New Fibers from DuPont"—Milton M Christie, E I du Pont de Nemours & Co, Inc

"Recent Developments in the Dyeing of Verel Modacrylic Fiber"—R J Fortune, Tennessee Eastman Co

"New Color-Measuring Instruments for Use by the Textile Industry"—F J Rizzo and A O Ramsley, Quartermaster Research and Engineering Command, U S Army

"The Applicaton Principles of Acrylic Backcoating"—Charles E Hoey, Rohm and Haas Co

"Dyeing Zefran Acrylic Fiber in Blends"—F M Rawicz, Dow Chemical Co

"American Standard Performance Requirements for Textile Fabrics"—Ephraim Freedman, Macy's Bureau of Standards

"Shade Control for Military Textiles Used by the U S Army Quartermaster Corps"—F J Rizzo, QM R & E Command

"The Effect of Weft Yarn Twist upon the Properties of Cotton Fabrics Before and After Resin Treatment"—Edna Meshke, Univ of California

*Minutes———*

# 203rd Meeting
# TECHNICAL COMMITTEE ON RESEARCH

THE 203rd Meeting of the Technical Committee on Research was convened at 9 am on Friday, November 18, 1960 in the Colonial Room of the Sheraton-Atlantic Hotel, New York, NY, with the chairman presiding. The following members were present:

G S Wham, chairman, TCR
F Fortess, vice chairman, ECR
C A Sylvester, chairman, ECR

| | |
|---|---|
| E Artim | G J Mandikos |
| C A Baker | E Morrill |
| V L Chase | J E Norton |
| A T Clifford | D J Ott |
| P J Fynn | G P Paine |
| N F Getchell | F A Prisley |
| H B Goldstein | B A Ryberg |
| C C Gordon | F T Simon |
| G J Greendonner Jr | R B Smith |
| W G Helmus | J G Stass |
| W A Holst | J M Straley |
| A E Johnson | N A Truslow |
| G O Linberg | G W Wernz |
| E M Lynch Jr | P J Wood |
| V D Lyon | C L Zimmerman |

Others present:

| | |
|---|---|
| W L Acree | A C Merrill Jr |
| C H Brubaker | H H Mosher |
| A S Davis | O J Olson |
| E M Eddington | H L Ortstein |
| A S Endler | R W Pinault |
| W O Fischer | G F Richardson |
| E J Grajeck | E H Rossin |
| A J Kellner | I M Schafer |
| G M Kidder | T B Sevison Jr |
| W Klaas | J F Synan |

After calling the meeting to order, Chairman Wham asked for approval of the minutes of the 202nd TCR meeting as published. A motion to this effect was made and seconded. The motion was adopted.

Chairman Wham continued with the following remarks:

"Today we are honored with the presence of representatives of a number of Corporate Members of AATCC, specially invited to attend this —the 203rd meeting of the Technical Committee on Research to witness AATCC research in action.

"For those of you who may not be familiar with the organizational structure of AATCC, this Committee, commonly known as TCR, is a standing committee of the Council, AATCC's governing body. It translates into action program and policy developed by the Executive Committee on Research—ECR—which is also a standing committee of the Council.

"TCR is composed of approximately 150 members including councilors representing sections, chairmen of research committees and appointed members. It is responsible for directing the work of some 40 research committees actively working on such subjects as colorfastness to washing, 'wash-and-wear,' nuclear radiation and antibacterial agents. Another 30 committees, having completed their projects, are on a 'reference' or 'standby' status. A good indication of the growing interest and importance of AATCC committee work is the fact that approximately 75 new appointments were made to these committees during the past year, increasing the total membership on these committees to well over 500. The 16 research committees and subcommittees which held meetings yesterday include representatives of some 120 companies and organizations.

"The chief product of these committees is the development and publication of test methods which, after appearing in the AATCC *Proceedings* published in the *American Dyestuff Reporter*, are incorporated into the annual *Technical Manual*. AATCC test methods and instruments have been adopted by many other organizations and enjoy a world-wide reputation. However, AATCC does not rest on its laurels, and AATCC committees periodically review test methods which they have sponsored, to insure that they are current and applicable with respect to the fast-moving technology of the textile and allied industries. Good examples of this can be seen in the three reprints which you now have in your hands. They represent refinements and new developments made during the past year in three existing methods, involving washfastness, drycleaning and 'wash-and-wear' properties."

The TCR chairman then introduced C A Sylvester, chairman of the Executive Committee on Research, who stated that Dr Wham had presented an excellent picture of AATCC's technical and research operations. Mr Sylvester stressed the vital importance of AATCC test methods to the textile, dyestuff and chemical industries.

COMMITTEE RA63, WATER RESISTANCE OF FABRICS———H B Goldstein, Committee member, reported for Chairman G A Slowinske as follows:

"George A Slowinske has succeeded Ruby K Worner as chairman.

"The Water Resistance Committee is continuing its study of the 'tumbler jar' or 'army-type' dynamic absorption test. The current program on the dynamic absorption test involves:

1) additional standardization of the blotters, especially with regard to absorbency,
2) a study of the standardized and motorized wringer assembly made by the Atlas Electric Devices Company, and
3) a study of an aluminum tumble jar developed by the Quartermaster Research & Engineering Command as a replacement for the present glass or porcelain tumble jar, which is no longer available. An interlaboratory test program on the tumble jar was agreed upon.

The cooperating laboratories are those of:

a) Quartermaster Research and Engineering Command
b) Ciba Co Inc
c) E I duPont de Nemours & Co, Inc
d) Warwick Chemical Co."

COMMITTEE RA23, COLORFASTNESS TO WATER———Chairman G J Greendonner Jr made the following report:

"This Committee (RA23) was reactivated in February, 1960, as a result of several requests to review the present AATCC Standard Test Method 63-1957, No. 3, Colorfastness to Chlorinated Pool Water.

"Two reasons for the re-study of this problem are:

1) the increasing use of home swimming pools, where the available chlorine content in most cases is not properly controlled, and
2) the present trend to slightly increase the available chlorine content in public swimming pools.

"A preliminary study is being made of various suggested test methods as well as modifications of the AATCC Test Method. Results of actual 'swim wear' tests and what correlation they have with the re-

sults of laboratory test methods are also being studied.

"However, up to the present date, the Committee's work on this problem has been entirely exploratory and has not progressed far enough to predict conclusive answers.

"Also, at the present time, the Committee is studying the possibility of establishing standards to be used in conducting this test method.

"The Committee has seven active members and three cooperating nonmembers."

COMMITTEE RA33, COLORFASTNESS OF TEXTILES TO ATMOSPHERIC CONTAMINANTS——J M Straley, chairman, reported briefly on the activities of Committee RA33. Originally the Committee had been concerned with the fading of dyed cellulose acetate due primarily to oxides of nitrogen ("gas fading"). In the past few years, the Committee has been investigating the effects of ozone and other atmospheric contaminants on dyed fabrics of various fiber content. Recent work of the Committee on Colorfastness to Light had indicated that fading of some colored fabrics occurred in outdoor exposures even when kept protected from sunlight. The problem was a difficult one because the composition of air is indefinite and variable. Committee RA33 would set up an interlaboratory test program to study the fading effects of these components of air. Field tests are already in progress.

COMMITTEE RA34, BLEACHING——Glen M Kidder, staff liaison, read the following report submitted by Committee Secretary A F Chadwick:

"The major part of the Committee's most recent meeting was spent discussing the problem of measuring fabric whiteness. It was agreed that the primary interest of this committee should be in developing a method for evaluating the effectiveness of the bleaching process, not for measuring the shade of finished goods.

"Data were submitted from five laboratories on the examination of seven samples by a newly suggested measuring procedure. It was agreed that the secretary would correlate these data and report back to the members. An attempt will then be made to decide which type of measuring procedure should be adopted."

COMMITTEE RA49, RESISTANCE TO INSECT PESTS——D J Ott, chairman, reported as follows:

"Recent progress in revising the 1952 AATCC mothproofing test method has mainly involved a joint effort by the AATCC and the ASTM in establishing a satisfactory test method for carpet material. The CSMA (Chemical Specialties Manufacturer's Association) cooperative test data has been reviewed by the 'Insect Pest Damage' Task Group of the ASTM committee on pile floor coverings. This task group is headed by R E Miller, who has recently prepared a revison of the 1955 ASTM method which includes all of the CSMA revisions of 1959.

"It is anticipated that, except for minor changes, this procedure for testing the mothproofness of carpet material will be accepted by the members of the three committees as well as by the government advisory members. The procedure can then be included in the proposed revision of the 1952 AATCC method, which presently includes procedures for fabrics and yarn only.

"In order to check the new method, Dr Miller has suggested that a small cooperative test be run which will include treated and untreated carpet material. Several of the CSMA and government laboratories with the CSMA strain of carpet beetles have offered to run the tests and Dr Miller is now making arrangements to get the necessary samples.

"The problem of standardization of the AATCC moth test cloth is still presenting difficulties. After additional discussions with W Klaas, of Testfabrics, it appears that our previous plan to stockpile a five-year supply of the cloth is not practical. And he has indicated that, in the future, it should be possible to maintain better uniformity with successive lots of the present worsted warp, wool filled material. The current lot is being studied by both AATCC National Headquarters and C H Bayley's group at the National Research Council in Ottawa. It is hoped that, after their tests for construction, fiber fineness, etc, it will be possible to include more exact specifications in the proposed revision of the AATCC method. Biological results to date with the current moth test cloth indicate a satisfactory but lower level of feeding than that obtained with the best previous lot of AATCC moth test cloth (December 1956) and the European standard woolen serge (IWTO, 1957)".

COMMITTEE RA60, COLORFASTNESS TO WASHING——Virgil D Lyon, chairman, reported as follows:

"The Washfastness Committee met on September 22, 1960, and approved two resolutions to be submitted to the Technical Committee on Research for approval.

1) That the use of the one-pint metal cylinder available from Atlas Electric Devices Company, or the present one-pint glass jar shall be optional in AATCC 36-1957 and for IA test in AATCC 61-1960T.

The manufacturers of the glass jar have indicated that they may discontinue this item. Also, due to breakage, several laboratories have indicated they would prefer the metal cylinders. Duplicate wash tests on 60 fabrics were run in both containers. Comparison for alteration in shade and staining of attached fiber effects showed that similar results were obtained in both containers.

2) That AATCC 61-1960T specify the use of cotton effect fibers only for determining staining in the IIIA and IVA wash tests. The use of multifiber test fabric would be optional but the staining of acetate, nylon, silk and wool should be disregarded unless one of these fibers was present in the fabric being tested or known to be in the final garment.

It was called to the attention of Committee RA60 that many fabrics are rejected for washfastness, particularly in the higher temperature test methods, due to the staining of acetate, nylon, silk and wool. Fabrics containing these fibers should never be washed at higher temperature either alone or in the presence of other fabrics possessing good fastness. The Committee was polled by letter ballot and recommends this change in AATCC 61-1960T.

"The Committee had been asked to determine if the IVA Wash Test, which duplicates five commercial white washes, also duplicates five home washings with chlorine. The following exhibits were examined at our meeting on November 17.

Nineteen commercial fabrics including seven sheets and 12 towels were subjected to:

1) Standard IVA Test.
2) Modified IVA Test at a pH of 9.4.
3) Modified IVA Test at a pH of 11.5.

These tests exhibited good correlation and where slight differences were noticeable, the present IVA test was the most severe in many cases.

A second set of tests were made on 19 commerical sheets which were tested as follows:

1) Standard IVA Test.
2) Five washes in an agitator-type automatic washer, temperature 145-150°F, eight ounces of Clorox in 16 gallons of water, at a pH of 9.4.
3) Same as number 2 but a pH of 10.2.

Again with only a few exceptions the IVA test predicts the effects of home washing with chlorine. The Committee sees no need to carry out further work on this project.

"It was recommended that we prepare an article for the *American Dyestuff Reporter* concerning the damaging effect of excessive chlorine bleach both on the shade of dyed fabrics and the loss of tensile strength of the fabric itself. Most of the machine manufacturers suggest using the quantity of bleach recommended by each supplier. In most cases this is several times more than used by the commercial laundry and far in excess of that needed. It's hoped that, by calling this to the attention of the Home Laundry Institute and equipment manufacturers, sufficient publicity can reverse this trend.

"John Stass presented a very interesting exhibit of wash tests for the Committee's examination. With the original fabrics still available and other samples to be obtained, an interlaboratory survey is planned to determine if our present series of tests adequately covers all levels of washability."

A motion was made and seconded that the two proposals by Committee RA60 be circulated to TCR for lettter ballot. The motion was adopted.

COMMITTEE RA61, WASH AND WEAR———G W Wernz presented the following report for Graham M Richardson, chairman:

"The three subcommittees of the Wash-and-Wear Committee met separately to disuss progress on their special projects.

"The Subcommittee on Objective Methods of Evaluation has completed the compilation of data resulting from its interlaboratory studies, and while there appears to be very good agreement in certain areas of rating fabrics by proposed alternate methods. certain anomalies have appeared which are requiring further study on details of lighting arrangements. Four laboratories will be checking recommendations of the Committee that the Cranston Light Box be employed from a suspended position above the viewing board so as to emphasize the surface appearance of test samples, particularly of printed qualities, which have failed to show agreement on initial studies.

"The Subcommittee on Instrumental Methods of Evaluation has observed the three known instrumented methods, namely the Hunter Wrinkle Meter, the Cluett-Peabody Smoothness Evaluator, and the DuPont LAP Wrinkle Meter. The work of this committee involves a study of these methods in an attempt to determine whether or not they fill the needs of the AATCC as far as standardized tests are concerned. Some preliminary work has been done on a small scale to evaluate the performance of these units, but the Committee feels it is premature to recommend any specific programs to the full committee for action.

"The Subcommittee on Creases and Seams reports that 13 laboratories are participating in an interlaboratory study to determine what favorable methods have been proposed to establish test routines for evaluating creases and seams. Three of the laboratories have completed their data and whereas the results seem favorable, they are not in shape to give a tentative reaction at this time.

"Bryant Northcutt, who arranged the Wash-and-Wear Committee's exhibit at the national convention in Philadelphia, reported that, whereas comments are very favorable as to our Committee's efforts, the traffic at the exhibit was very light."

COMMITTEE RA68, DETERMINATION OF ODOR IN RESIN-TREATED FABRICS———Chairman P J Fynn presented the following report:

"Committee RA68, Determination of Odor in Resin-Treated Fabrics, has considered work done by several of its members to set up physical standards in the form of solutions of known concentrations of formaldehyde to approximate five levels of intensity to be used in judging the odor produced by resin-treated fabrics. Formaldehyde was selected because it offers a very ready material which is characteristic of the majority of odors causing problems in finishing. It is not intended to overlook amine odors; attention will be given them at a future date.

"In the data that was collected from a number of observers using the solutions of formaldehyde in graduated strengths, it was noted that, if formaldehyde odors are sampled in the order of their increase in concentration, most observers can easily differentiate the five graded intensities which start at a threshold value of about 0.05%. However, when the strongest concentrations are sampled first, then there is varying ability to distinguish between the lower levels.

"It has not been overlooked that there may exist sophisticated methods of detection using the techniques of gas chromatography, but the Committee was attempting to produce a method which would be readily available to laboratories without expensive research equipment.

"It is intended that the Committee continue looking into the matter."

COMMITTEE RA50, COLORFASTNESS TO LIGHT——— V L Chase, chairman, reported the following:

"Our work on new lots of light standards has been completed at a cost within the budgeted amount, and F J Rizzo has turned over to AATCC National Headquarters full yardage of Blue Wool Standards L-2 to L-8. These standards have not been released for use, since final tests are being made by the National Bureau of Standards and the Committee in the Fade-Ometer, Xenotest Machine and outdoors in Arizona and Florida.

"It is hoped that, upon completion of these tests, the Standards can oe released. This should be determined before the end of the year."

COMMITTEE RA45, IDENTIFICATION OF FINISHES ON TEXTILES———TCR Secretary Mandikos presented a proposal submitted by T D Miles, chairman of Committee RA45, that the identification method developed for antiseptic and mildew-resistant finishes be circulated to TCR for letter ballot. The following statement accompanied the proposal:

"In considering the problem of developing qualitative methods for the identification of finishes, Committee RA45 drew up a list of finishes that would be found on textiles and divided these into 11 major categories. A test method is to be developed for each category. The categories are listed in AATCC Tentative Test Method 94-1959, Analysis of Finish in Textiles (pp 69-72, *1960 Technical Manual*).

"The following method has been completed for category 2, antibacterial, mildew resistant, etc. It is designed to fit into AATCC 94-1959T. In checking the method, commercial

fabrics, advertised as antibacterial treated, were circulated to the members of the Committee for analysis. These were found to contain metallic, quaternary and antibiotic types, using the method. After approval by the Committee, the method was circulated to seven companies which produce finishes of this type. Their comments were favorable."

A motion was made and seconded that the proposal by Committee RA45 be circulated to TCR for letter ballot. The motion was adopted.

NEW BUSINESS——W L Acree of Burlington Industries, recognized by the chairman, presented a problem which he felt deserved the attention of AATCC. He stated that certain bleaches, when used according to the manufacutrer's directions, caused considerable color damage on some dyed fabrics. The labels of these products implied that they were safe for colors. This situation was becoming more aggravated with the advent of automatic bleach dispensers on some automatic washers which were apparently designed on the basis of the recommendations of bleach manufacturers. The chairman stated that he would present this problem for consideration by an appropriate committee within whose scope this matter might fall.

ADJOURNMENT —— There being no further business, the meeting was adjourned at 10:40 am.

Respectfully submitted,
s/s G J MANDIKOS
*Secretary, TCR*

# NOMINATIONS FOR THE HAROLD C CHAPIN AWARD

THIS award is presented annually at the Association's Annual Convention to a Senior Member of at least twenty years continuous membership in AATCC who has contributed outstanding service in enabling the Association to attain the objects for which it was founded. The award is in the form of a suitably worded, framed, illustrated scroll.

Established in 1958, the first recipient was Harold C Chapin, for whom the service award was named, who served as secretary of AATCC during a quarter of century. Dr Chapin was cited for his example that inspired the creation of the award, for his outstanding leadership, for dignity and integrity in office, for indefatigable attention to minor detail and major policy, for advancing the Association's objectives, for bringing national and international prestige to the Association, and for long and devoted service.

The selection of the recipient is by the unanimous choice of a committee consisting of one member from each of the four Regions, appointed for four years by the Councilors of the respective Regions, the president of the Association ex-officio, and the executive secretary as secretary of the committee without vote. The committee rotates annually with the occurrence of one vacancy to be filled, the chairmanship being assumed by the committee member serving his fourth year. No committee member may be reelected for at least one year following completion of his term.

Senior Members of AATCC are invited to furnish full and detailed information of candidates nominated for this award, such as service on AATCC Research and Council Committees, accomplishments and contributions in enabling the Association to attain the objects for which it was founded. Organized campaigns promoting the candidacy of any individual will not be recognized by the committee. Consideration will be given only on factual evidence of the nominee's qualifications.

Nominations may be addressed to the Harold C Chapin Award Committee, c/o the executive secretary, AATCC National Headquarters, Box 28, Lowell, Massachusetts, and should be received prior to April first.

# Membership Applications

**January 19-25**

## CENTRAL ATLANTIC REGION

### Metropolitan Section

**Senior**

*Richard T Julio*—Chemist, presently technologist, Shell Chem Corp, New York, NY. Sponsors: F Tripp, F R Tripp

*Harold G Latham*—Colorist, Applikay Textile Prints, Passaic, NJ. Sponsors: C Tedeschi, P Bruinooge.

*Muneaki Sekiya*—Tech staff member, Kanebo New York Inc, New York, NY. Sponsors: G E Linton, J J Pizzuto.

**Associate**

*Kenneth A Reinhart* — Research chemist, Celanese Corp of America, Summit, NJ.

## SOUTHERN REGION

### Palmetto Section

**Senior**

*William O Wissner* Jr—Overseer dyeing, U S Rubber Co, Winnsboro, SC. Sponsors: N A Truslow, H A DesMarais.

### Northern Piedmont Section

**Senior**

*Carmen A Cornette*—Dyeing supt, Webco Dyer's Inc, Burlington, NC. Sponsors: G R Turner, J C Thomas.

*Neville P Lewis*—Cost & quality control, Burlington Finishing Co, Altavista, Va. Sponsors: J E Greer, J T James.

**Transfer to Senior**

*Aubrey R Hoover*—Sales rep, Charles E Boger, mfrs agents representing Syn-Chem Corp, Spartanburg, SC. Sponsors: F H S McCoy, A H Gaede.

## WESTERN REGION

### Mid-West Section

**Associate**

*Charles T DeCoursey*—Supt, textile division, Iowa State Industries, Fort Madison, Ia.

## STUDENT CHAPTER

### New Bedford Institute of Technology

**Student**

*Kanubhai S Desai*—Student, New Bedford Institute of Technology, New Bedford, Mass. Sponsor: F Tripp.

# Activities of the Local Sections

## Washington

WASHINGTON Section met December 19 at the Harris Research Laboratories, Washington, DC, with Chairman Nelson F Getchell presiding.

The following officers were elected for 1961: *Chairman*—Louis R Mizell; *Vice chairman*—Esther L Batchelder; *Secretary* — Florence H Forziati; *Treasurer*—Edmund M Buras Jr; *Councilor*—Nelson F Getchell; *Sectional Committee*—Ralph L Carr, Fred Loibl Jr, Kathryn M Towne, and M Kathryn Wharton.

The technical session was highlighted by two informative addresses. John F Krasny, Harris Research Laboratories, discussed "'Wash-and-Wear' Wool Fabrics". In his illustrated talk, he exhibited wool fabrics that showed excellent dimensional stability after laundering in a home washing machine. Tumble drying did not increase the shrinkage of these fabrics but improved their appearance. Mr Krasny emphasized that high twist, close yarn spacing, and use of plain weaves were important for achieving dimensionally stable wool fabrics. Shrinkage and fuzz control were also obtained by chemical stabilization treatments. Mr Krasny declared that smoothness of appearance depends on fabric weight; and that for best "wash-and-wear" wool, the fabrics should be set by crabbing or padding with bisulfite, and then steamed.

Ethyl C McNeil, Clothing and Housing Research Division of the Agricultural Research Service, United States Department of Agriculture, discussed the "Control and Transmission of Bacteria by Fabrics". She described the mechanics of transmission of bacteria by textile materials, and the increase in bacterial counts in laundered textiles due to shorter wash cycles and cooler laundering temperatures. She indicated that substantial percentages of colonies of *Staph Aureus* and *Microbacterium Butyricum* remained on wool, muslin and acetate fabrics even after 50 days, especially at 70% relative humidity; *E Coli* was much less resistant Dr McNeil emphasized the need for quantitatively evaluating the effectiveness of antibacterial treatments for textile materials.

**WASHINGTON SECTION OFFICERS (1961): Front row, l to r: Florence H Forziati, secretary; Louis R Mizell, chairman; Esther L Batchelder, vice chairman. Back row, l to r: Kathryn M Towne, sectional committee member; Nelson F Getchell, National Councilor; Edmund M Buras Jr, treasurer; and Fred Loibl Jr, sectional committee member. Sectional committee members Ralph L Carr and M Kathryn Wharton were not present when photo was taken.**

**Ethel C McNeil, Agricultural Research Service, USDA (left) and John F Krasny, Harris Research Laboratories, speakers at Washington Section's Dec 19 meeting**

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## Hudson-Mohawk

APPROXIMATELY sixty-seven members and guests attended the January 13th meeting of the Hudson-Mohawk Section held at Jack's Restaurant, Albany, NY, at which time a panel discussion on "Nonwoven Fabrics" was held.

Speakers were William K Saunders, vice president, Kimberly-Stevens Corp, New York, NY, who spoke on the marketing of nonwovens produced by his company; Raymond R Stevens, director of research, The Felters Co, Millbury, Mass, who discussed the different aspects of manufacturing in the processing of nonwovens; and Earl Marshall, beater room superintendent and colorist, Smeallie & Vorhees Paper Co, Amsterdam, NY, who gave a brief history of nonwovens.

A question-and-answer period followed the panel discussion.

The Section's next meeting will be held March 10 at the Chelsea House, Tribes Hill, NY, at which time another panel discussion will be devoted to the subject "Wash-and-Wear Fabrics". Making up the panel will be representatives of chemical suppliers, fabric manufacturing, fabricator and retail house, each presenting his picture of "wash-and-wear" fabrics.

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## Palmetto

THE new section of AATCC based on the state of South Carolina, which began to function January 1, formally adopted the name "Palmetto Section" at its first meeting on January 21.

The following slate of officers will guide the new section through its first year:

*Chairman:* Richard E Rettew, Polymer Southern

*Vice chairman:* Neal Truslow, U S Rubber Co

*Secretary:* E T McIlwain, Ansbacher Siegel Division of Sun Chemical Co

*Treasurer:* Wm E Baldwin, Fairforest Finishing Co

*Committeemen:* R J Breazeale, Warwick Chemical Co; John Bell Jr, Bishopville Finishing Co; George Cocoros, Deering-Milliken Research Corp; and W F Thompson, Clearwater Finishing Co

*Councilors:* J C King, Metro-Atlantic, Inc; Linton C Reynolds, Riegel Textile Corp; Lewis T Kelly, Lyman Printing & Finishing Co

Meeting dates through the Spring of 1962 have been confirmed. (See AATCC Calendar for dates).

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## Metropolitan

TWENTY-EIGHT members and guests braved one of the season's worst storms to hear Elliot Morrill, Corn Products Co, deliver his first formal speech as president of AATCC at the January 20 meeting of the Metropolitan Section at which Chairman P J Fynn, J C Penney Co, presided. Mr Morrill spoke on "The Aims and Objectives of AATCC", the full text of which appears in the February 6 issue.

Mr Morrill was introduced by Edwin I Stearns, American Cyanamid Co, program chairman.

In addition to Mr Morrill, AATCC national officers at the meeting included Charles A Sylvester, E I duPont de Nemours & Co, Inc, chairman, AATCC Executive Committee on Research; and George P Paine, AATCC executive secretary.

## Employment Register

*This column is open for two insertions per year, per member, without charge. Blanks may be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.*

61-1
*Education:* BS, organic chem & textiles.
*Position desired:* Textile chemistry research, quality control or analytical chemist.
*Location:* Anywhere.
*Age:* 32; single; references.
2-6, 2-20

61-2
*Education:* High school; evening certific LTI.
*Position desired:* Head dyer.
*Location:* New England, Metropolitan NJ area.
*Age:* 46; married; one dependent; references.
2-6, 2-20

61-3
*Education:* PhD in Physical Chemistry, Osmania University, India; M Sc in Physical Chemistry; M S in Textile Chemistry & Dyeing; Senior Member, ACS and AATCC.
*Position desired:* Research director
*Location:* East coast, mid-west or abroad.
*Age:* 40; single; reference (excellent).
2-20, 3-6

## AATCC DECEASED

| *Member* | *Section* |
|---|---|
| HARRY A SUNDEEN<br>Munsingwear, Inc<br>Minneapolis, Minn | MW |
| RUSSELL C SMITH<br>Cranston Print Works Co<br>Cranston, RI | RI |

## Exhibit to be Held at Buffalo Convention

THE 1961 Convention Committee has announced that an exhibit will be held in conjunction with this year's AATCC Convention in Buffalo, NY, September 27-29 at the Hotel Statler. It is reported that the enthusiasm of exhibitors who participated in the 1960 Convention Exhibition in Philadelphia has prompted the Buffalo Committee to renew this feature. It is stated that member response also indicates that the 1961 Convention is considered a very desirable opportunity to familiarize themselves with the best and newest of their suppliers products.

It is pointed out in the announcement that more than half the population of the United States and Canada lives within 500 miles of Buffalo. The Canadian Association of Textile Colourists and Chemists will participate with AATCC in this Convention. These advantages, added to the outstanding combination of industrial, scenic and vacation attractions of the Niagara Frontier are expected to produce a better than average attendance.

The headquarters and exhibit hotel has reserved for the Association's use almost twice as many rooms as it has had at its disposal in any headquarters hotel previously, the Committee reports.

It is suggested that exhibitors will find this an exceptional opportunity to present their product to a select audience.

## AATCC Calendar

NATIONAL CONVENTIONS
Sept 27-29, 1961 (Hotel Statler, Buffalo, NY); 1962 (Atlanta Biltmore Hotel, Atlanta, Ga); 1963—Boston; 1964—New York; 1965 (Conrad Hilton Hotel, Chicago, Ill)

DELAWARE VALLEY SECTION
Mar 3 (Beck's on the Boulevard, Philadelphia, Pa); Apr 14 (Ladies Night—Cherry Hill Inn, Haddoofield, NJ); May 19 (Outing—North Hills CC, North Hills, Pa); Sept 15 (Wilmington, Del); Oct 27 (Beck's); Dec 1 (Beck's)

HUDSON-MOHAWK SECTION
Mar 10 (Johnstown, NY—paper on "Wash-and-Wear" Fabrics); Apr 14 (Waterford, NY—plant tour of General Electric Co's Silicone Div); May 12 (Ladies Night); June 23 (Outing—Antlers Club, Amsterdam, NY)

METROPOLITAN SECTION
Mar 24 (Kohler's Swiss Chalet, Rochelle Park, NJ—"Market Opportunities for Color"—Arthur N Adlam, Werner Textile Consultants); April 21 (Kohler's Swiss Chalet, Rochelle Park, NJ—"Importance of Bow and Skew"—Lucille Rea, Simplicity Patterns, and John Robertson, Mt Hope Machine Co); May 19—(Kohler's Swiss Chalet, Rochelle Park, NJ—Ladies Night).

MID-WEST SECTION
April 15 (Schroeder Hotel, Milwaukee, Wis); June 24 (Annual Outing—Cerami's Island View Resort, Burlington, Wis)

NIAGARA FRONTIER SECTION
Apr 7 (Joint meeting with Ontario Section, CATCC, St Catherines, Ont); May 18 (Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
May 5-6 (New England Regional) Meeting, Jug End Barn, S Egremont, Mass

PALMETTO SECTION
Apr 15-16 (Richmond Hotel, Augusta, Ga); June 8-10 (joint outing with Piedmont Section at Grove Park Inn, Asheville, NC); Sept 15-16 (Clemson House, Clemson, SC); Jan 20-21 (Poinsett Hotel, Greenville, SC); April 14-15, 1962 (Francis Marion Hotel, Charleston, SC)

PIEDMONT SECTION
April 22 (Washington Duke Hotel, Durham, NC); June 9-10, 1961 (Outing—Grove Park Inn, Asheville, NC); Sept 23, 1961 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION
Mar 24 (Dinner Meeting); May 5-6 (New England Regional Meeting, Jug End Barn, South Egremont, Mass); June 23 (Outing); Sept 15 (Management Meeting); Oct 27 (Dinner Meeting); Dec 1 (Annual Business Meeting)

SOUTH CENTRAL SECTION
Apr 15 (Hotel Patten); June 16-17 (Summer Outing—Riverside Hotel); Sept (Hotel Patten—tentative)

SOUTHEASTERN SECTION
Apr 8 (Atlanta Athletic Club, Atlanta, Ga); June 9-10 (Summer Outing, Radium Springs, Albany, Ga); Sept 9 (Ida Cason Gardens, Pine Mountain, Ga); Dec 2 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND
Mar 17 (Shelton, Conn); May 5-6 (New England Regional Meeting, Jug End Barn, S Egremont, Mass); May 19 (Ladies Night—Rapp's Paradise Inn); June 9 (Annual Outing); Sept 15 (Plant visitation); Oct 27 (Annual Meeting); Dec 1 (Shelton, Conn)

AATCC's "top brass" confer with Metropolitan Section Chairman P J Fynn, J C Penney Co, at the Section's January 20th meeting. L to r: Charles A Sylvester, E I duPont de Nemours & Co, Inc, chairman of AATCC's Executive Committee on Research; Elliott Morrill, Corn Products Co, AATCC president, who outlined "The Aims and Objectives of AATCC" at the meeting; and Mr Fynn.

(Photo courtesy of Edward Artim, J C Penney Co)

# COLOUR INDEX HUE INDICATION CHARTS AVAILABLE FROM NATIONAL HEADQUARTERS

Copies of the *Colour Index* Hue Indication Chart are now available from National Headquarters at a price of $1.50 per copy.

The most important property of any coloring matter is its hue on a given substrate. The coloring matters in each usage section of Part I of the *Colour Index* have therefore been subdivided into a regular series of hue groups for which the conventional descriptions yellow, orange, red, violet, blue, green, brown and black (with the addition of white in the section devoted to pigments) have been adopted. This classification has been incorporated in the system of serial usage numbers in Part I. Each entry carries a reference number, eg, CI Acid Yellow 1 or CI Vat Blue 20; these numbers are consecutive within each hue group and will be extended as supplementary volumes appear. The commercial name under which a coloring matter is marketed does not necessarily give a precise indication of its hue. This is well illustrated by the wide divergence which frequently occurs in the commercial names used by different manufacturers for the same coloring matter. To overcome these inconsistencies and to introduce some measure of standarization a *Hue Indication Chart* was devised. This chart, in the shape of a hexagon, gives prominence to the six major divisions of alternate primary and secondary hues and at the same time provides continuity. Each side of the hexagon is divided into three parts, eg, the yellows are divided into greenish yellow, yellow and reddish yellow. The tertiary hues are placed inside the area of the primary and secondary hues and in association with the parent hues. A neutral grey occupies the center of the hexagon with four radial grey patterns forming a link with the other tertiary hues. Special provision has been made for pinks which are placed adjacent to the reds but outside the hexagon. Cooperating dye and pigment manufacturers were asked to describe the hue of each of their products in accordance with this hue Indication Chart, which is contained in a pocket in Volume 4. In the Chart there is an outline diagram which records the formal descriptions associated with the individual chromatic areas. Each chromatic area is designated by an outline which functions as a line of demarcation between the different areas. Many of the chromatic areas are qualified by the terms bright and dull.

This Chart enables a reader to translate into visual terms the verbal descriptions of hue given in the *Colour Index*.

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# NOTICE TO AUTHORS OF PAPERS

MANUSCRIPTS for the *Proceedings* of the American Association of Textile Chemists and Colorists shall conform to the requirements and standards given in this *Notice*. Before publication, manuscripts for the *Proceedings* shall be approved by the Editor, not only for editorial correctness according to the standards of this *Notice*, but also for content of technical matter. In his work, the Editor may enlist the aid of anonymous reviewers who are selected for expert knowledge in particular fields.

It is presumed that authors in studying the comments of reviewers and of the Editor will remember that all recommendations are made in a kindly, helpful, sympathetic manner to improve the paper in both literary and technical excellence. Although authors should cheerfully consider suggestions, they are expected to defend their position if justified, especially when strictly technical matters are involved with which the authors have an intimate knowledge.

AATCC strives to maintain a high scientific and professional standard for papers. Authors must make every effort to avoid the use of trade names, commercial products or process names wherever such use may be construed as advertising. Wherever possible, scientific nomenclature must be employed eg, *Colour Index* designations for dyestuffs and pigments in place of the trade names. It is recognized that in some instances trade names are necessary to avoid lengthy description. Certain trade names have been so widely used as to become generic and these normally are permissable. Further, some technical papers may involve the presentation of a new product or process wherein trade name reference is obligatory.

Giving due consideration to such valid exceptions, it is incumbent upon the author to maintain the proper scientific attitude, avoiding any expressions or devices aimed at promoting a particular product or process.

Questionable papers are to be referred to the chairman of the Publications Committee, who will submit them to an editorial board which would be appointed as needed. The Board would report to the Publications Committee, which would have the final voice in accepting or rejectin a paper.

MANUSCRIPTS — Manuscripts shall be typewritten double-spaced with approximately one-inch margins on 8.5x11-inch white paper. In addition to the *original*, at least one carbon copy is required. Pages are to be numbered consecutively with Arabic numerals, and each page after the first shall carry the authorship at the very top. Tables and figures shall also be numbered consecutively, the tables with headings containing Roman numerals as TABLE I, TABLE II, etc, and the figures with Arabic numerals as Figure 1, Figure 2, etc, appearing *below* the figures. The names of the authors and their laboratories or business connections should appear below the title of the paper.

LITERARY STYLE AND FORM OF PRESENTATION—In the writing of papers, authors are requested to observe a trenchant, simple style of writing directed to textile chemists and colorists with at least an elementary knowledge of chemistry, physics, mathematics, engineering, textile processes and textile machinery.

In the organization of the material, there should be one or more introductory paragraphs setting forth the occasion, significance and main objectives of the paper and of the method of attack. This should be followed by the body of the presentation, either with discussions interspersed throughout this portion or with a collected section marked "DISCUSSION" after the main body of the paper. Finally, there may be a brief section at the end entitled "SUMMARY" or "CONCLUSIONS."

Center and side headings make for easier reading. Center headings should be employed sparingly and generally will include only very important section headings, such as "INTRODUCTION," "EXPERIMENTAL," "DISCUSSION," "CONCLUSIONS," "SUMMARY," and "REFERENCES." Side headings (see sixth paragraph of this *Notice* for an example) shall be indented and run into the text to which they apply, and shall be separated from the paragraph by a dash. The publisher will print center headings in bold-face capitals and side headings in capitals.

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The spelling and rules of punctuation followed in manuscripts shall be those found in the "Merriam-Webster New International Dictionary"; abbreviations and chemical formulas shall conform to *Chemical Abstracts*.

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# ADR ABSTRACTS

(*continued from page 32*)

completely nonnitrogenous epoxy resins not long ago. They were later modified and adapted for use in conjunction with ethylene urea resins. The epoxy resins react through an entirely new mechanism which links the cellulose chains together.

Combinations of epoxy resins with dimethylol ethylene ureas possess the good crease recovery of the nitrogen resins with the outstanding chlorine resistance of the epoxides.

Nitrogenous resins of the triazone type although discovered many years ago have finally been perfected and can now be processed without objectionable amine odor.

So far, no "wash-wear" finish has been commercial successful on viscose rayon, the author states. By the use of a dimethylol urea resin, rayon fabric of high "wash-wear" rating can be produced, but at sacrifice of abrasion resistance. The author suggests a program for further work on this problem.

The use of resins as binders for nonwoven fabrics, and as backers for woven fabrics used for upholstery and draperies, is also discussed.

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## Developments in Coated Fabrics

Stafford, T W, *Dyer 124, 573, 575, Oct 7, 1960*

Modern development of coated fabrics probably originated in the application of linseed oil compositions to fine cloths in the manufacture of oilskins for protection against the weather, the author says. This was followed by the introduction by Charles MacIntosh of india-rubber as a waterproof coating for fabrics. Nitrocellulose, synthetic rubbers, polyvinyl chloride and other plastics were later employed as coating materials.

The author describes the machinery and the technique employed in the preparation of coating media. Methods used in applying the various polymers to fabrics include spreading, calendering, dipping and laminating.

Spreading machines are of various types, but all consist essentially of a knife under which the fabric is drawn and which smears on it a thin film of coating material. Tenter spreading machines were developed to overcome the uncontrolled shrinkage of natural fiber fabrics occurring frequently during the spreading operation.

Calendering is often carried out on a machine of the four-bowl type. Dip coating consists of passing the fabric through a trough of polyvinyl chloride solution or paste and subsequently "gelling" in a vertical oven.

A laminating process is described in which decorated PVC sheet is stuck to the fabric by means of either pressure or an adhesive. This method is useful on open-weave nets and scrim fabrics.

Decoration of the coating can be achieved in several ways, eg, by embossing, or by printing contrasting colors, or both.

The author also describes a method of producing "breathable" coated fabrics, in which PVC is applied discontinuously in such a way that the hard-weaving surface of PVC is retained, together with high moisture-vapor permeability.

Rayon, glass, nylon and Terylene are all now being used as substrates for coatings. New adhesive systems have been developed for these fabrics, including the introduction of isocyanates in PVC and rubber mixes.

The coating of nonwoven fabrics is also described.

## Russian Fiber News

Nesterova, V, *Man-made Textiles 37, 73, Dec, 1960*

A new Russian fiber, obtained from methyl vinyl pyridine, is described. This monomer, produced from petroleum waste, and mixed with synthetic rubber, increases the strength of the rubber and its frost resistance.

In describing the efforts to produce a synthetic fiber from the monomer, one of the researchers wrote:

"It was hard to tell at once what properties the fiber would have. Soon, however, it became clear that from such fiber it is possible to produce cloth with ion-exchange properties, capable of absorbing certain ions from solutions passing through it. Sea water filtered through this cloth loses its salt. Ordinarily special towers are built for this purpose and are loaded with ion-exchange resins. A compact cloth filter is much more convenient and much cheaper. Moreover, it absorbs ions many times faster."

Milk filtered through such cloth immediately turns into cottage cheese, the author states (!). This simple method can be easily used on any farm, he says. The new cloth can catch ions of valuable metals from solutions of extremely low concentration. These are said to be only a few of the properties of this "unusual" fiber.

The Russian scientists also discovered that, by grafting a molecule of cellulose (in a cotton or linen fabric) to molecular compounds of a certain polymer, it is possible to obtain a "hybrid" possessing the useful properties of both initial materials. By this method ion-exchange fabrics are produced; cotton fabrics are made "rot-resistant, etc".

Another Russian fiber, Ftorlon, is described as follows:

"Its thread is silky, elastic and thin. Outwardly it differs little from ordinary synthetic fibers. But that is not so. Ftorlon has properties one doesn't even suspect. Its thin thread is practically stronger than steel. It can stand a load of more than 100 kg per sq mm. A rope one sq cm in cross-section can pull a ten-ton truck. And what is particularly valuable is that the new fiber withstands extremely strong chemical reagents such as conc nitric acid, hydrogen peroxide, and even aqua regia, which attacks even precious metals."

(Abstractor's note: Ftorlon is described elsewhere as "a fluorine-containing compound that has no counterpart in the U S." See *Am Dyestuff Reptr 49*, No. 13, 45, 1960.)

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## An Introduction to Textile Properties of Corval and Moynel Fibers

Cheatham, A F, *Can Textile J 77, 55-8, 61-2, Dec 23, 1960*

Viscose rayon, in spite of its many advantages as a textile fiber, has definite limitations. Its initial low modulus when wet makes continuous finishing processes impossible, and its low physical strength in dilute caustic soda prevents its use in mercerization except in low blend levels with cotton.

The new cross-linked cellulosic fibers, Corval II and Topel II, and the high wet modulus fiber, Moynel, have been developed by Courtaulds (Alabama) to overcome these deficiencies.

Corval II and Topel II have a wet tenacity and elastic recovery superior to Fibro (ordinary rayon). The water imbibition of Corval II is 45-55%; of Topel, 55-65%; and of Fibro, 110-120%. Both Corval and Topel are similar to Fibro in resistance to acids, bleaching agents, and common solvents, but they are much more resistant to caustic soda. They are insoluble in

cuprammonium hydroxide. They are equal to cotton in resistance to weathering, and definitely better than Fibro. The basic difference between Corval and Topel is in the degree of cross-linking.

Moynel was formerly known as SM-27 or SC-28. Its manufacture is based on the concept of maintaining maximum cellulose chain lengths in its fibers. Moynel resembles Fibro in resistance to acids, bleaching and scouring agents, and common solvents (including cellulose solvents), but is much more resistant to caustic soda and should be mercerizable. It is said to be equal to cotton in wet tenacity, and superior to cotton in dry tenacity and resistance to weathering and light degradation. The water imbibition of Moynel is 60-65%.

Fabrics made from these cross-linked fibers exhibit little or no progressive shrinkage, and necessitate very little resin for good stability. "Wash-and-wear" fabrics have been prepared with the use of DMEU resin. High crease angles, both wet and dry, have been obtained. Resin finishes may also be used on Moynel.

The new fibers can be dyed like ordinary rayon, with only minor modifications. While the dye affinity of Moynel is slightly less than that of rayon, it is greater than that of cotton.

It is expected that Moynel will find employment in knit goods, and also in blends with polyesters for fine shirtings. Corval II may be used in suiting blends, and fine-denier Topel II in the apparel field.

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## Carriers in Dyeing

Anon, *Dyer* 124, 875, Dec 2, 1960

The usual medium employed to carry out orthodox dyeing processes is water. The function of the water is to carry the dye in either solution or dispersion, and to swell the fiber to permit entry of the dye molecules between the molecules of the fiber. The size of the dye molecules and the degree of swelling are naturally important. There is great difference in the swelling behavior of the various fibers in water; eg, viscose rayon saturated with water and hydroextracted takes up 90 percent of its weight, due to imbibition, while Terylene takes up only five percent.

When a dye is applied from an aqueous medium to a fiber which swells to only a limited extent in water, the dye molecules must necessarily be small in order to get between the fiber molecules. An example would be the application of disperse dyes to Terylene. The larger molecules dye very slowly on to this fiber, the build-up to depth is slow, and it is extremely difficult to obtain certain dark shades. Under these circumstances, selected carriers have proved useful in dyeing both Terylene and other hydrophobic-type fibers.

The function of the carrier is to swell the fiber still more and consequently facilitate the entry of the dye molecules. The degree and rate of swelling must be controlled, otherwise the fiber may be damaged or even dissolved. In order to obtain consistent results, conditions of time, temperature and concentration must be regulated. It is difficult to maintain control if the concentration of carrier is quickly reduced by volatilization during dyeing. If a carrier which will remain in the bath is not available, a closed system should be employed.

In some cases the carrier does not substantially affect the imbibition of the fiber, but rather loosens the internal structure, thus permitting more opportunity for diffusion of dye into the fiber. In this way the minimum amount of damage is done to the fiber and the fabric (eg, excess stretching is avoided).

It is highly important, when using most carriers, to remove all traces of the carrier before drying. If this is not carried out, damage or even destruction of the fiber can take place in some cases.

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## Newer Developments in Sodium Chlorite Bleaching

Deschler, O, *Can Textile J* 77, 62-8, Nov 25, 1960

The author points out that it is the task of the bleacher to try and minimize the harmful effect caused by the bleaching process. This is especially important when processes have to follow where damage to the fiber is unavoidable, such as crease resisting. In this respect, sodium chlorite provides the least harmful of all preliminary treatments, as it has the least degrading effect on cellulose, he says.

From the time sodium chlorite was first introduced for textile bleaching, it was speedily adopted for regenerated cellulose and bast fibers. The wet tearing strength of rayon (never good) is not further reduced by chlorite bleaching; and the time required for bleaching linen is much shortened by the use of sodium chlorite.

Knitwear, either all-cotton or mixed with rayon, is mainly bleached in Europe with sodium chlorite in packing machines made of stonewear. This process is described, and its advantages over hypochlorite and peroxide bleaching are explained.

Sodium chlorite has been used on a large scale in Europe for bleaching cotton piece goods for about three years. The advantages of open-width bleaching over rope bleaching are pointed out (more uniformity in the whites and in the subsequent absorption of dyes and resins).

The first open-width bleaching plant was a wholly continuous unit, in which the cloth was padded with alkaline chlorite solution and immediately run through a steamer at 221°F. Formic acid was injected with the steam. This process was not a success, because the white was inadequate (too short time) and the cotton husks were not destroyed and had to be removed later by boiling on the jig.

To obtain enough time for the chlorite to react properly, the continuous process was changed to a discontinuous one. The fabric, after passing through the steamer, was wound on large rolls, 50-60 inches in diameter, and stored for a sufficient time. The padding liquor should have a pH of 5-6, using acetic or formic acid, which are the most economical activators. This process, which has many advantages, is described by the author in much detail. It is said to be in use in many European plants at present.

Three different systems of fully continuous open-width bleaching which have been recently developed in Europe are also described.

The construction material recommended for chlorite bleaching machinery is high-quality stainless steel containing 18% chrome, 8-10% nickel, and at least 2% molybdenum.

•

## Basic and Applied Aspects of the Flameproofing of Textiles

Richards, H R, *Can Textile J* 77, 68-76, Dec 9, 1960

The need for noncombustible textiles has been recognized since earliest times. Asbestos, although a poor fiber for textiles, has been used for centuries.

Many inorganic substances have been recommended for flameproofing textiles, one of the most important being a mixture of borax and boric acid; this treatment, however, is not permanent.

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**Alizarine Light colors**—level dyeing acid dyes with good to excellent light fastness on wool and silk.

**Alizarine Milling, Brilliant Alizarine Milling colors**—for dyeing wool, nylon, or silk from a weakly acid bath. Extremely fast to light, and to mill processing; meet men's wear requirements.

**Artisil* dyes**—level, fast colors for acetate, polyamide, polyester and certain acrylic fibers.

**Cuprofix* dyes**—for good wet fastness on cotton and viscose. For improved fastness of anti-crease treatments.

**Drimarene*-Z reactive dyes**—for prints and pad dyeing of bright shades with high wet fastness on cellulosic fibers. Unfixed portion of dye easily removed by washing. Excellent storage stability of printing pastes. In padding—excellent stability, high solubility; avoid tailing-off and migration effects. Unfixed portion of dyestuff simply and easily removed. Excellent reproducibility of shade.

**Foron* ultra-dispersed dyes**—for polyesters and blends. Excellent light, wet, perspiration, and abrasion fastness; minimal particle size.

**Lanasyn* dyes**—fast, neutral dyeing premetallized dyes for wool, nylon, silk, and acrylic fibers.

**Lanasyn Brilliants**—non-metallized dyes in bright shades, for use in combination with the regular Lanasyn dyes.

**Lumicrease* dyes**—fastest-to-light direct dyestuffs ever offered—a complete line of color.

**Omega and Metomega Chrome dyes**—for woolens and worsteds that meet the highest standards in men's wear.

**Pyrazol* Fast dyes**—direct colors for fastness to light and washing, offering maximum economy.

**Sandonyl* dyes**—for barre-free color on filament nylon; superior light and wash fastness.

**Sandothrene Ultrasperse* Vat dyes**—especially prepared for all types of dyeing; and, for printing, Sandothrene printing types are recommended.

**Vitrolan* colors**—acid dyeing, premetallized dyestuffs giving good colorfastness on wool and various synthetic fibers—at moderate cost.

**Xylene Fast colors**—level dyeing on wool or silk, using sulfuric acid. Good selection for bright shades.

**Xylene Fast "P" colors**—combine good fastness to wet treatments with level dyeing on wool, nylon and silk from neutral or weakly acid baths. All have approximately equal rates of exhaustion and migration, and behave in combination as would a homogenous dyestuff.

**Pigments**—Printofix* resin bonded colors for textile printing and padding.

**Chemicals**—for brighter, whiter whites, Leucophor* BS Liquid optical brightener; or, in a bath with acid catalyzed resins, Leucophor A. For softening, Ceranine* HC softening agent. For level dyeing, Lyogen* P and Lyogen DK and SMK leveling agents. For efficient soil removal, Sandopan* DTC, the leading detergent for cotton and synthetics.

**Information on new developments** in dyestuffs, chemicals and dyehouse formulations is made immediately available to SANDOZ customers. If your fight is for better quality, join forces with SANDOZ to win. SANDOZ, Inc., 61-63 Van Dam St., New York 13, N.Y. ALgonquin 5-1700.

*T. M. Sandoz, Inc.

SANDOZ

THINKS AHEAD WITH TEXTILES

SANDOZ

## FLAMEPROOFING PROCESSES AVAILABLE FOR TEXTILES

| *Process* | *Company* | *Type* |
|---|---|---|
| BANFLAME | Joseph Bancroft | Urea phosphate |
| DURABLE FLAME RETARDANT | Monsanto | Melamine polyphosphate |
| ERIFON | Du Pont | Ti and Sb oxychlorides |
| FLAME RETARDANT PA | Monsanto | Phosphorylamide |
| IRGAPYROL EF | Geigy | |
| LIFEGUARD | Peter Spence Ltd | Oxy salts of Ti and Sb |
| MS2 | International Flame-proofing Corp | |
| PERMAPROOF 305 | Treesdale Labs and Processing Co | |
| PHORESIN III | Victor Chemicals | B-Dialkyloxyphosphono-propionitrile |
| PROBAN | Proban Ltd | THPC |
| PYROBAN | E F Drew | THPC |
| PYROSET D | American Cyanamid | Urea phosphate |
| PYROSET DO | American Cyanamid | Melamine polyphosphate |
| PYROVATEX | Ciba | |
| TACO | Taylor Chemical Co | ZnO, $ZnCO_3$, boric acid and chlorinated compound |
| TIMONOX | Associated Lead Manufacturers Ltd | $Sb_2O_3$ and PVC |
| TITANOX FR | National Lead Co | Ti and Sb salts |

W H Perkin, in 1913, patented a durable process, consisting of the precipitation of tin oxide on the fiber. Since that time, many other durable finishes have been recommended, most of them utilizing phosphorus compounds (eg, urea, cyanamide, etc).

As to which fibers are the greatest fire hazards, the author suggests the following approximate order of increasing flammability: glass or asbestos cloth, nonflammable synthetics (Verel, Saran, Dynel, etc), wool, silk, flammable synthetics (Courlene, Zefran, etc), acetate, viscose rayon and cotton. Where nylon and Teryl-ene should appear in the list depends partly on the finish applied to these fibers, he says (nylon melts when a flame is applied). Wool is not usually considered a fire hazard in clothing because under normal conditions it does not propagate flame.

The flameproofing of cellulose products is discussed in great detail.

If cellulose is burned, there are various decomposition products which may be classified as volatile gases, tarry matter, char, and water. The burning of cellulose in excess air takes place in two stages: first, the flame runs quickly over the cotton, leaving a black char, and then the afterglow, or flameless combustion, consumes this char and leaves a negligible amount of ash. The afterglow is really a separate process, requiring special treatment.

Many theories have been advanced for the function of flameproofing agents. Some of these are as follows:

1) Production of nonflammable gases which shield the fabric from oxygen.

2) An impermeable glassy coating formed on the fiber surface (eg, with borax).

3) Heat dissipation by conductivity or endothermicity of the retardant so that the flaming reaction is not self-sustaining.

4) Hydrogen-bonding at flame temperatures preventing formation of small volatile fragments, therefore increasing the char.

5) Alteration of the decomposition path of cellulose to decrease the amount of flammable tars and gases.

6) Catalytic dehydration of cellulose.

Items 5 and 6 (and possibly 1) are considered the most important, and are discussed at some length.

The author describes numerous durable treatments which have been proposed, based on the application of phosphorus-containing compounds [eg, tetrakis(hydroxymethyl)-phosphonium chloride (THPC) combined with suitable resins].

A list of 17 flameproofing processes, mostly based on the use of phosphorus or antimony compounds, which have been made available by various manufacturers, is appended.

Forty-nine references to the literature are cited.

*(Additional Abstracts on pages 68, 70, and 72)*

# FUTURE PAPERS

The following specially contributed articles have been accepted for publication in American Dyestuff Reporter during 1961:

"The Effect of the Unsaturated Group on the Weathering of Chemically Modified Cottons"———Ricardo H Wade, Carl Hamalainen, and Albert S Cooper Jr, Southern Regional Research Laboratory

"Consumer Complaints: A Source of Information for Producers"———Samuel L Myers, Morgan State College

"Studies of Wrinkle Resistance Finishes for Cotton Textiles: III. An Accelerated Storage Test for 'Wash-and-Wear' Cotton Fabrics"———Richard L Arceneaux, Gloria A Gautreaux, Robert M Reinhardt, and J David Reid, Southern Regional Research Laboratory

"Energetic Interactions between Textile Fibers and Solid Soil in the Washing Process"———H Lange, Henkel & Cie, GMBH

"A Study of Hypochlorite-resistant Melamine-type Finishes"——— Sidney L Vail, J G Frick Jr and J David Reid, Southern Regional Research Laboratory

"Formamide-Formaldehyde Products as Wrinkle-Resistance Finishing Agents for Cotton Fabrics"———Sidney L Vail, J G Frick Jr, Paul L Murphy Jr and J David Reid, Southern Regional Research Laboratory

"Dimethyloltriazone Finishing Agents with Long-chain Alkyl Substituents for Cotton Textiles"———Sidney L Vail, J G Frick Jr, Paul J Murphy Jr and J David Reid, Southern Regional Research Laboratory

"Dyeing Unscoured Wool"———Louis I Fidell, American Cyanamid Co

"Dihydroxyethyleneureas as Wrinkle-resistance Finishing Agents for Cotton"———Sidney L Vail, Paul J Murphy Jr, J G Frick Jr and J David Reid, Southern Regional Research Laboratory

"Formic Acid Colloid of Methylolmelamine Resin Finish of Cotton for Wrinkle- and Muss-Resistance: Preliminary Cost Study"——— K M Decossas, O J McMillan Jr, W N Berard, W A Reeves, E F Pollard and E L Patton———Southern Regional Research Laboratory

"Wrinkle- and Muss-Resistant Finish for Cotton Using Formic Acid Colloid of Methylolmelamine"———W Norbert Berard, Ethel K Leonard and Wilson A Reeves, Southern Regional Research Laboratory

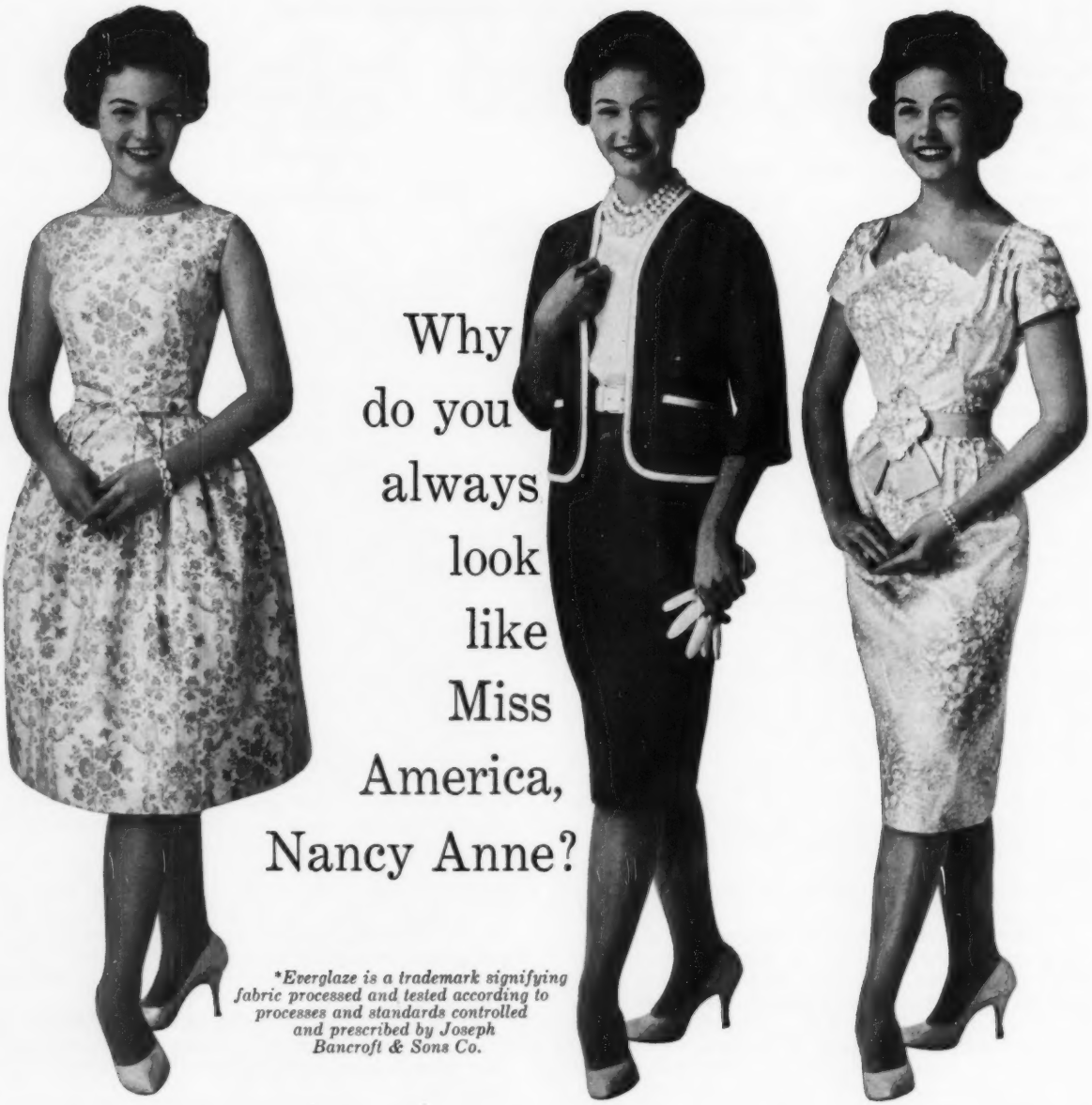
"New Methods for the Preparation of Alkali-soluble Textile Materials"———Robert M Reinhardt, Terrence W Fenner and J David Reid, Southern Regional Research Laboratory

"Continuous Dyeing of Orlon Acrylic Tow"———R J Thomas, E I duPont de Nemours & Co, Inc

"The Influence of a Surface Finish on the Flex Abrasion Resistance of Cotton Sateen"———Clarence J Pope and Louis I Weiner, U S Army Quartermaster R&E Command

"Preparation and Properties of Fibrous Partial Isobutyrates of Cellulose"———Hubert St Mard, Carl Hamalainen and Albert S Cooper Jr, Southern Regional Research Laboratory

"Factors Affecting the Cleaning of Graphite-stained Lace"——— Norman R Cohen, Sonneborn Chemical and Refining Corp



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# RHONITE

# ADR News Report:

General News of the Industry
Personalities in the News
New Products, Developments, Processes

## 31st Annual Meeting of TRI

Textile Research Institute will hold its 31st Annual Meeting on Thursday and Friday, March 16 and 17, in the new Windsor Ballroom Suite of the Hotel Commodore, New York, NY. The technical program for this meeting is being developed under the general chairmanship of George H Hotte, director of Allied Chemical Corp's National Aniline Fiber Marketing Department, and is rapidly nearing completion.

In addition to prominent technical speakers, the meeting will again feature an exhibit of instruments for scientific research, laboratory control, and product testing, in the Windsor Terrace immediately adjacent to the Ballroom. Those furnishing the industry with new products, supplies, and services have also been invited to participate in this exhibit.

The full program of this meeting is to be released shortly. Those wishing to receive invitational programs and advance reservation forms may do so by contacting the Institute's Secretary, P O Box 625, Princeton, NJ.

A $10.00 registration fee will cover both days of the meeting, and luncheon tickets for Thursday and Friday will be available for $6.00 each day. The exhibit area will be open to the public without charge.

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## Silk & Rayon Printers & Dyers Assoc Moves NY Office

The Silk & Rayon Printers & Dyers Association of America, Inc has moved its New York office from 1450 Broadway to Room 2101, 420 Lexington Ave, New York 17, NY.

Most of the activities of the New York office will be consolidated and handled by the Paterson, NJ office located at 7 Church St. According to Dean M Lewis, president, the consolidation of activities in Paterson will permit the continuance of all services previously rendered by the Association, and will also facilitate the establishment of additional new services for its members.

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## Knitting Arts Week to Coincide with KAE

"Knitting Arts Week", a promotion by the American knitting industry designed to underscore its progress, will be held April 23-29.

It will be highlighted by the 45th biennial Knitting Arts Exhibition, which will be held in Atlantic City, NJ, April 24-28. The exhibition is expected to attract about 15,000 trade representatives from the US and 35 foreign nations who will view latest advances in machinery, equipment, yarns, fibers, chemicals and specialized services which have been developed specifically by the domestic and foreign manufacturers for the industry.

Both the special "week" and the KAE will be sponsored by the National Association of Hosiery Manufacturers, National Knitted Outerwear Association, and the Underwear Institute.

The American knitting industry produces annually two billion pairs of hosiery, a billion underwear items, 800,000,000 outerwear items and 80,000,000 pounds of knitted fabrics. The trade's annual retail sales total more than $4 billion.

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## Tanners Dye & Chemical Co to Represent Putnam Chemical in NE

Arrangements were made between Putnam Chemical Corp, Beacon, NY, and Tanners Dye & Chemical Corp, Peabody, Mass, to have the latter company represent Putnam in the New England area.

Harry D Sentkowski, president of Tanners Dye & Chemical Corp, has been known for many years to the leather industry in the new England area. Tanners Dye & Chemical Corp carries stocks of tanning materials, dyestuffs, and auxiliaries in its Peabody warehouse.

Putnam Chemical Corp represents Badische Anilin- & Soda-Fabrik, Ludwigshafen, West Germany, in this country.

**North Carolina State Director of Conservation & Development Hargrove Bowles Jr (left), pinch-hitting for Governor Terry Sanford, congratulates John L Fancourt, president of the W F Fancourt Company, at ground-breaking of Fancourt new plant site in Greensboro, NC**

## NC Governor Cites Fancourt Co

North Carolina Governor Terry Sanford, in absentia, described the W F Fancourt Company, at its recent new plant ground-breaking ceremonies in Greensboro, NC, as "the kind of company we want in North Carolina, the kind of company which shares our enthusiasm for the future."

His speech was delivered by Hargrove Bowles Jr, State Director of Conservation & Development, who pinch-hit for the Governor who was called away unexpectedly for a meeting with President Kennedy in Palm Beach, Fla.

The ground-breaking took place on the 10-acre site purchased by the Fancourt Company in preparation for the construction of a modern, three-story plant and office building.

Present at the ceremonies was John L Fancourt, company president, accompanied by Greensboro Mayor George H Roach, and Bland W Worley, president of the Greensboro Chamber of Commerce. Also on hand were over 75 company personnel and civic and community leaders.

The new plant will cover an area of 25,300 feet and will supplement production and manufacturing facilities presently maintained in Philadelphia. It will incorporate a company office in Burlington, NC. Completion is set for late August.

It will be constructed of brick with an aluminum curtain wall and solar gray glass windows by King-Hunter Construction Company, Greensboro, from designs prepared by Charles a Crass, AIA, Philadelphia.

W F Fancourt Company, founded 57 years ago in Philadelphia, reportedly produces finishes for over half of the seamless hosiery manufactured in the United States today.

Fancourt is represented by Chemtex Products, Inc, in Toronto, Ontario, Canada; Paykel Brothers, Ltd, in Australia and New Zealand, and by A M Romero Corporation in the Caribbean, Central and South America areas.

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**ARKANSAS CO., INC.**

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**Pioneers of liquid whitening agents**

## Chemstrand Becomes Subsidiary of Monsanto

Shareowners of Monsanto Chemical Company voted approval January 16 of a proposal to acquire the interest of American Viscose Corporation in The Chemstrand Corporation.

Chemstrand now becomes a wholly owned subsidiary of Monsanto.

More than 90 percent of the votes cast by Monsanto shareowners meeting were in favor of the proposal. It was also approved by Avisco shareowners meeting in Philadelphia.

Chemstrand, formed as a joint venture in 1949 by Monsanto and Avisco, is reported to be the nation's second largest producer of nylon and acrylic fibers. The company operates three US plants and has a wholly owned subsidiary making Acrilan acrylic fiber in Northern Ireland. It also holds important minority interests in acrylic fiber-producing companies in Italy and Japan.

●

## NC State School of Textiles to Revamp Program

Reflecting a national trend in higher education, North Carolina State College's School of Textiles is presenting a "new look" in its vast teaching and research functions.

A glimpse of the revamped program in education, research, and industrial services was given the officers and directors of the North Carolina Textile Foundation, Inc, in a day-long series of talks, tours, and forums on January 18.

Welcoming the top-level textile executives to the State College campus were President William C Friday of the Consolidated University of North Carolina and Chancellor John T Caldwell of State College.

On hand to lead discussions on a completely revised research and training program in the School of Textiles were Dean Malcolm E Campbell and his associates on the faculty.

The educators explained that curriculum revisions have been directed toward a shift from the "how-to-do-it" learning process toward more emphasis upon the physical sciences, textile technology, and the humanities.

Objective of the academic shift is a strengthened instruction program aimed at the well-rounded education of State College's surging enrollment in textiles.

In addition to less specialization and more general education in the classrooms, the revised program, officials said, offers an integrated functioning of research and teaching, thus keeping students in close touch with fundamental concepts of science and technology and also with the rising tide of new scientific information.

Speakers reported that the freshman enrollment in textiles has jumped from 47 in 1958 to 147 in 1960-61, that a graduating class of 90 will get textile degrees at NC State this year, that research functions have been broadened in the last two years, and that a record-breaking program of services has been and is being provided the textile industry.

Joining Dean Campbell in presenting progress reports on enrollment, industrial services, and the research investigations were Professors E B Grover, Henry A Rutherford, Dame S Hamby, G H Dunlap, and William E Smith.

Professor Grover, head of the Department of Textile Technology, reviewed changes in course sequences, explained the educational objectives of the School of Textiles, and said the revised programs of instruction have brought about more effective utilization of the school's facilities.

He said the number of semester credit hours required for graduation has been slashed from 160 to 141, making it possible for students to concentrate more fully in professional studies and offering closer contact with the faculty.

Curricula revisions resulted in dropping 26 textile courses and adding 15, he said.

Professor Rutherford, head of the Department of Textile Chemistry, explained that applied and basic research work —financed both by private grants and State appropriations —has been expanded, enabling the college to serve the industry on a wider scale and at the same time add to the store of textile knowledge.

He noted that the North Carolina General Assembly made its first investment in textile research at NC State College with an $80,000 appropriation two years ago. The school's annual research budget exceeds $500,000, with most of the funds coming from private research grants.

Equipment, which the college has acquired through its research investigations for private companies, make the School of Textile laboratory facilities unequaled in the country, Professor Rutherford stated.

Reviewing services provided to the State's textile industry, Professor Hamby said the quality audit program now reaches companies having a total spindle capacity of 536,000. In this work, the college collects samples, tests the materials, interprets the results, and reports back to the participating mills.

In addition, he said the college has provided a sequence of short courses on quality control, executive management, and the application of textiles to the furniture industry.

In addition to courses offered at NC State College, the School of Textiles also has given short courses in Charlotte and Gastonia and plans a course this spring in Greensboro.

On top of this, Professor Hamby said special courses have been offered for various company staffs, three extension specialists are available for consultation to industry, a complete library service is provided, and a photostat service is offered.

Prof Dunlap, director of placement, said the 90 students graduating this year have had a total of 938 interviews with company representatives who are seeking to employ them. This makes more than 10 interviews per student, indicating a great demand for textiles graduates of the college.

Professor Smith explained that he and Professor Dunlap already have visited some 71 high schools in North Carolina and neighboring states during the current school year, participating in "Career Day" programs at the high schools. Interest among high school students in careers in textiles is at an all-time peak, he asserted.

The visiting industrialists toured the multimillion dollar facilities of the School of Textiles and heard a report on the Japanese textile industry Wednesday afternoon.

William A Newell, former research director in the School of Textiles and newly appointed product planning director for the Whitin Machine Works, Whitinsville, Mass, reported on a tour of Japan's textile plants.

Japanese manufacturers, Newell said, are getting three times as much research per dollar invested as are United States mills beacuse of less manpower costs in the Orient.

Japanese mills, he stated, are doing both machine and fiber research and are pushing the further development of their textile industry.

Trade groups are busy picking up the latest technical information and passing it along to their member mills through an expertly managed communications system, Newell said.

Education costs are lower there than in America. It costs Japaneses students about $161 per year to attend the University of Tokyo and other leading universities.

Automation is coming to Japan mills, he reported. He said one mill has completely converted its spinning process to automation.

The conference wound up with a question-and-answer period in which the manufacturers presented NC State College educators their ideas.

Unanimous approval was expressed on the college's moves to switch from specialized courses to a combination of technology and the humanities.

●

## 45th Swiss Industries Fair, Basle

Switzerland's national industrial fair, the Swiss Industries Fair in Basle, will take place for the 45th time April 15-25.

In 17 fair groups, something like 2300 exhibitors will cover a total exhibition area of 1,420,850 sq ft.

Full information, identity cards and a copy of the catalogue can be supplied by the official Swiss representatives in foreign countries (Swiss Embassies, Legations, Consulates, Chambers of Commerce, agencies of the Swiss Office for the Development of Trade and the Swiss National Tourist Office).

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## GE Lowers Prices on Silicone Products

General Electric has announced further price reductions in the price of silicone antifoam compounds and antifoam emulsions. G-E's Silicone Products Department in Waterford, NY said the reductions would decrease the price of silicone antifoam compounds by 20 cents per pound and Antifoam 60 emulsion by 10 cents per pound.

The price decrease represents about four percent on both lines.

This is the second reduction in silicone prices to be made by G-E in five months. A four percent reduction in the price of silicone fluids and emulsions was made in June of this year. A previous cut, also of four percent, occurred in September 1959.

**ENZYME EXPLORATION—Wallerstein president Arthur C Emelin, center, explains enzyme fermentation techniques to industrial pharmacists. The group shown here, in front of a fermentation tank, were among the 34 members of the Society of Pharmacists in Industry who toured Wallerstein's plant and laboratory facilities on Staten Island. The company, a division of Baxter Laboratories, Inc, is a leading producer of enzymes and other fermentation products.**

●

## Redyeing Industry Experiences Best Year

The redyeing industry experienced its best year since the end of World War II according to a year-end report given at the annual meeting of the Garment Dyers Guild of America, concluded last month in San Diego, Calif.

Gabriel Illovsky of Tru-Color Dye Works, Long Island City, NY, re-elected president of the nationwide group, attributed the improvement to new developments which assure colorfast work on garments, fabrics, furnishings and table linens, and to the general economic recession in the latter part of 1960. In periods of recession, he pointed out, there is more emphasis among householders on redyeing and refurbishing garments and household furnishings rather than replacing them with new purchases.

The annual meeting brought together regional directors of the Guild, which represents the wholesale redyeing plants which service the nation's retail drycleaning establishments as well as hotels and other institutions.

Ernest Gecz, Paul Dyeing Co, Newark, New Jersey, was re-elected vice president and John Egli, General Dyeing Co, Indianapolis, Ind, was re-elected treasurer. In recognition of the vast increase in redyeing on the West Coast and the opening of new dyehouses there, a new post of Western Regional vice president was established, to which John F Eurich of The Dye House, San Diego, was named.

In a speech at the annual meeting, William Crafton, past president of the San Diego Drycleaners Association, said that the drycleaning industry is becoming increasingly aware of the tremendous profit potential in the proper handling and promotion of redyeing for the nation's families.

William Ingham, West Coast manager of National Aniline Div, in another address revealed to the group the development of a great array of new dyes and redyeing techniques which, it is expected, will lead to further growth in public demand for redying services.

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## "New Developments for Modern Living"

The first showing of a Sandoz motion picture in color, featuring new developments in the paper field, was held at New York's Waldorf-Astoria Hotel on Wednesday evening, January 25.

The guest list for the premiere of 'New Developments for Modern Living" included chief executives from companies and associations in the paper and textile industries. emphasis on the latest of the company's Leucophor pro-

The film shows a number of new developments, with ducts, which is said to enable paper manufacturers to offer a fluorescently brightened paper which appears "whiter than white." As a corollary to the Sandoz Leucophor development, the motion picture also shows other new developments not only in the paper field but also in the allied industries of textile and leather, where the company's products are also used.

Among the organizations whose plants and products are shown in the movie are: Clupak, Inc, West Virginia Pulp & Paper Co, Strathmore Paper Co, Whiting-Plover Paper Co, The Grand Union Co, Northern Dyeing Corp and Skinner Textiles.

## IACD Joins WWAI

The International Association of Clothing Designers, important style-setting association in men's fashions, has become a member of Woolens and Worsteds of America, Inc, which is conducting an educational program on a national level on behalf of the American wool textile industry. In turn, Woolens and Worsteds of America, in an exchange of participation and membership, has become a member of the International Association of Clothing Designers. The IACD, whose membership comprises designers of men's clothing firms internationally and associate members who are suppliers, dyers and finishers, etc, has its main office in Philadelphia, Pa.

Primary goals of Woolens and Worsteds of America are to acquaint the American consumer with the merits of American-made wool products and to expand the use of wool textiles loomed in America.

Co-sponsored by the American Sheep Producers Council, Inc, the National Association of Wool Manufacturers, the Northern Textile Association, and the Wool Promotion Fund of the Wool Trade, the association has an extensive membership participation by individual mills, textile machinery manufacturers, suppliers, processors and other segments.

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## Foremost Food and Chemical Co Enters Fatty Nitrogen Field

Foremost Food and Chemical Co, Oakland, Calif, has announced that it is entering a new chemical field with the completion of a plant in Oakland to product fatty nitrogen chemicals.

The plant, which has been under construction for the past 18 months, is now being put into initial operation. Arthur P Berry, president, pointed out that the new plant will be the only manufacturing source of fatty nitrogen chemicals west of the Mississippi. The original unit has been designed for an annual capacity of approximately 20 million pounds.

Output from the new Foremost facility will be used primarily in textile softeners, nonferrous ore flotation, corrosion inhibitors, insecticide intermediates and in lubricants, oil additives and other petroleum products.

The new plant is a highly efficient unit and is extremely flexible, according to Mr Berry.

"It is designed to meet the increasing needs of the chemical process industries for fatty nitrogen derivatives of outstanding quality," he said. "These chemicals, to be marketed under the name of Formonyte, will be distributed nationally."

Foremost Food and Chemical, through its "Eldo" line of products, is a major supplier of high purity coconut fatty acids, methyl esters and related chemical products. The company, headquartered in Oakland, is a wholly owned subsidiary of Foremost Dairies, Inc.

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## NCC to Continue Sponsorship of Research on Resiliency

Research on resiliency, recognized as one of the most important properies of the cotton fiber, will be sponsored for another year by the National Cotton Council.

Improved resiliency through chemical finishing has already given a tremendous boost to cotton's ability to compete for markets, the Council states.

Leonard Smith, director of the Council's utilization research division, warns, however, that further improvements in cotton's resiliency will require more basic research.

"If we are to succeed in making cotton as resilient as wool, we need a genuine scientific breakthrough," Dr Smith says. In addition to "wash-wear" improvements, the Council is anticipating improvements in cotton's drape, elasticity, warmth, hand, and resistance to matting.

Council market research figures show that more than a million of the nine million bales of cotton consumed in 1959 can be attributed to the development of chemically finished "wash-wear" cottons. They also show that improved resiliency would help cotton compete for synthetic fiber markets consuming the equivalent of 4.6 million bales of cotton annually.

A total of $45,000 will be available for continuation of the study in 1961 at the Textile Research Institute, Princeton, NJ. The Council will contribute $15,000 and the additional $30,000 will be made up of contributions by 12 textile mills, finishers, and chemical manufacturers which are joint sponsors.

## GPC Move to Bloomfield Completed

General Plastics Corp has moved its complete facilities to 55 La France Ave, Bloomfield, NJ. The firm was formerly located in Paterson, NJ.

The new plant reportedly has been equipped with modern equipment necessary to provide custom coating services to industry. Larger facilities are said to be capable of handling parts up to tank car size.

In addition to Teflon, Kel-F, epoxy, nylon, and other coatings, new departments have been set up to apply Penton corrosion-resistant coatings, and Norton Company's Rokide ceramics. These additions will offer customers a complete custom coating service under one roof, the company states.

Other new facilities reportedly will produce copper-clad laminates with a Teflon-impregnated glass base, 34" × 36". Regular laminates can be produced to whatever thickness desired with an all-over dimension of 36" × 36", it is stated. Endless belts are being made from Teflon-impregnated glass fabric and this base material, 36" wide is also sold by the yard. General Plastics also works in developing applications for Teflon and other materials to meet customers' specific needs.

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## Venango Engineering Co Names Southern Sales Representative

Venango Engineering Co, Philadelphia, Pa, has announced the appointment of Industrial Equipment Co, 1411 Johnston Bldg, Charlotte, NC, as its Southern sales representative.

Industrial Equipment Co is headed by Alexander F Schenck and John R Schenck.

Venango Engineering Co is a designer and builder of special machinery, including dyeing, drying and finishing equipment.

# NEW PRODUCTS AND DEVELOPMENTS

**Textile Palletainers**

## USP Palletainers

USP Palletainers, heavy-duty steel mesh containers, reportedly are rapidly gaining popularity in textile plants across the nation.

Textile Palletainers are said to offer the advantages of modern container unit handling methods, the safety of steel-wire mesh, under standard or special protective finishes, plus ease of space-saving storage and rapid, economical movement or shipment of unitized loads.

Palletainers reportedly offer economical handling methods for in-work storage of cones, spools, spindles, quiller bobbins, and yarns in processing phases. Palletainers with protective "snap-in" liners of duck, canvas, polyvinyl or vinyl covered canvas are said to be valuable for processing through all stages of wet or dry finishing, temporary storage and intermill shipment.

Textile Palletainers, manufactured exclusively by Union Steel Products Co, Albion, Mich, are available in standard or special sizes and types. Complete information, literature, specifications, catalogs and prices are available upon request to the company's Albion affice.

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## "CP" Gum Arabic

Paul A Dunkel & Co, Inc, Jersey City, NJ, has announced that naturally pure gum arabic is now available in production quantities.

It is claimed that "CP" gum arabic has the following advantages: freedom from insolubles; greater stability in emulsions; no filtering problems; no valve wear; and low iron, enzyme and bacteria count.

Samples and technical literature are available from Paul A Dunkel & Co, Inc.

## Dutch Textile Laundering Unit Utilizes Vibrators to Facilitate Removal of Clots and Loose Particles

Textile dyeing and printing firms are continually seeking new and more efficient methods of laundering fabrics subsequent to treatment. Solids such as sizing, clots and loose dye particles, often present after processing, must be removed without damaging the material itself.

A Dutch firm at Almelo, The Netherlands, after exhaustive experimentation on the effect of vibrating versus non-vibrating full-width washing units, is currently manufacturing a vibrating type which is claimed to vastly improve upon conventional units.

The machine reportedly operates on a power output of 0.25 kw and transmits 3,000 vibrations per minute to the fabric during laundering. As the cloth runs through the guide rollers, it passes over the vibrators—ribbed sheets of rust-proof steel 0.12" thick—at a slight angle, to ensure contact without need for extra tension on the material. This facilitates removal of loose resin clots or particles while preventing weakening of the fibers themselves.

Efficiency of the unit is said to be further enhanced by the large amounts of fabric that are in contact with the ribbed sheets.

The vibrators are connected to a rugged frame by stainless-steel motor-driven rods. To prevent vibrations from being transferred to the laundering unit, the entire vibrator frame is suspended in heavy rubber buffers.

The textile washing unit is manufactured by N V Machinefabriek H Brugman for exports by Gebr Stork & Co's Apparatenfabriek N V Amsterdam.

For further information, write the Netherlands Trade Commission, 551 Fifth Ave, New York 17, NY.

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## Thermoprint

Improved brilliance and sharpness of print on polyester fabrics is said to be the promise of a new carrier developed by The Harshaw Chemical Co. Called Thermoprint, the new carrier was designed for use where the thermosol method is used for development of the print.

When Thermoprint is used, it is claimed that printed fabrics submitted to a minimum of 300°F for five minutes will indicate a brilliance and sharpness of mark which heretofore have been difficult to obtain. Thermoprint reportedly does not leave any adverse effect in the fabric after the developed prints are washed and finished. While it is primarily intended for the thermosol method, Thermoprint is said to give equal results with the steaming and aging methods, and to eliminate the need for several types of printing assistants. Thermoprint is supplied in the form of a free-flowing white paste to be added by volume directly to the print paste.

Complete information may be obtained by contacting The Harshaw Chemical Co, Zinsser Division, Hastings-on-Hudson, NY.

## Algepon XR

A new, efficient stripping assistant for vat dyes is now being manufactured by the Arkansas Co, Newark, NJ.

An advancement in the Algepon group of stripping auxiliaries, Algepon X R is claimed to represent a breakthrough in efficiency that extends to vat dye of the anthraquinone type, such as CI Vat Blue 6 and some of the olive greens used to produce khaki shades which have been difficult to discharge to a satisfactory ground.

After the dye has been satisfactorily stripped, there is no tendency for the color to redevelop under normal conditions, it is claimed. Algepon X R is said to be easy to use, involving only the addition to a conventional sodium hydrosulfite and caustic soda bath. It reportedly has excellent storage properties.

A technical service bulletin on the properties and application of Algepon X R is available through Arkansas sales representatives and also from Company headquarters at Newark.

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## "Ross Wax" 160 Alters Characteristics of "Hot-Melts"

Slip (nonblocking), viscosity, flow, spreading, setting (point and time) may be changed by the addition of waxes to resin and elastomer compositions.

A recently introduced synthetic wax, "Ross Wax" 160 is, suggested by its manufacturer for the above purpose in "hot-melt" coatings, adhesives and sealants to change their characteristics. Samples and data on "Ross Wax" 160 are obtainable from Frank B Ross Co, Inc, 6 Ash St, Jersey City, NJ.

# PERSONALITIES IN THE NEWS

Ritz

Bruch

Eagleson

Chapman

Zilch

Emery Industries, Inc, Cincinnati, O, has announced two key appointments in its Organic Chemicals Division and four in its Fatty Acid Division. Both are newly formed divisions.

*J W Ritz* has been named sales manager of the Organic Chemicals Division, and *R C Bruch* becomes works manager of the Cincinnati plant.

Mr Ritz served as assistant sales manager of the Oragnic Chemicals Department for the past four years. As divisional sales manager, he now will supervise, through direct sales representatives, sales of all products produced by the division.

Mr Bruch has been production manager of the Cincinnati plant for the past 12 years. As works manager, he will be responsible for production of all products of the division. He also will serve as administrative head of all plant operations in Cincinnati, including industrial relations, plant utilities and maintenance.

*D R Eagleson* has been named sales manager of the Fatty Acid Division. He will supervise a force of direct sales personnel and is responsible for the sales of fatty acids east of the Rockies.

*R W Chapman* becomes production manager and will supervise the production of all products of the Fatty Acid Division. *R I Imholt* has been named assistant production manager for this division.

*K T Zilch* has been appointed technical director for the Fatty Acid Division. He will head up research, quality control, and development and service.

Mr Eagleson was assistant sales manager of the Fatty Acid Department for the past four years; Dr Zilch was formerly head of the Process Research Section of Emery's Research Department; Mr Chapman had been assistant production manager for the past five years; and Mr Imholt had been general foreman of the fatty acid section of the Cincinnati plant.

Arnold, Hoffman & Co Inc has announced that *W Chester Cobb* has stated that he will not continue as president of the Company after the next annual meeting to be held on March 30. The board has indicated its intentions of electing *Thomas Richardson*, formerly sales director, to succeed Mr Cobb.

Mr Cobb stated that he will form the Cobb Chemical Company. He emphasized that this action has been taken with the agreement, full cooperation and assistance of the responsible officials of Arnold, Hoffman and its parent company, Imperial Chemical Industries, Ltd. Mr Cobb will remain a director of Arnold, Hoffman. The headquarters of his company will be in Providence, and the company will will act as selling agent for certain Arnold, Hoffman products.

Dr Richardson has spent his entire business career with ICI and Arnold, Hoffman. He has been a director of Arnold, Hoffman since 1958.

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The Fibers Division of American Cyanamid Co has named *Martin B Friedman* to the post of manager, merchandising department.

Since 1959, Mr Friedman has been manager of the advertising and promotion department of Cyanamid's Organic Chemicals Division. Prior to this, he was manager of advertising and promotion for that division's textile chemicals department.

While in this post, he also served for one year as a marketing consultant to the Fibers Division, which markets Creslan acrylic fiber.

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The appointment of *William W Hays* as marketing manager of Atlas Powder Company's chemicals sales department has been announced.

Mr Hays, who had been acting marketing manager since March, 1960, joined the company in 1946 as a salesman in what was then the industrial chemicals department.

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*Lyman E Fourt*, assistant director of Harris Research Laboratories, Washington, DC, has been chosen as the 12th recipient of the Harold DeWitt Smith Memorial Medal given by Committee D-13 of the American Society for Testing Materials. This medal is awarded annually by the Society's Committee D-13 on Textile Materials for outstanding achievement in the science of textile fiber utilization.

Dr Fourt will receive the award on Thursday, March 2, at the Sheraton Atlantic Hotel in New York at the Spring Meeting of Committee D-13. The presentation will be made by *Herbert F Schiefer* of the National Bureau of Standards, who is chairman of Committtee D-13 and was the first recipient of this award in 1950. *Milton Harris*, vice president of the Gillette Company, will review the outstanding achievements of the Medalist.

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The appointment of *Howard Ketcham* as color consultant to the Dyes Department of American Cyanamid Company was made public January 24.

Mr Ketcham is regarded as a pioneer in the color engineering profession. His concepts of color planning and merchandising reportedly have brought increased consumer acceptance to more than 300 products and services since 1935.

Brick

Shown

Buurman

Raab

Witman

Billings

Raytex Chemical Corp, Allentown, Pa, has appointed *Leon P Brick* vice president—director of sales.

Mr Brick was formerly with Onyx Chemical Corp as executive vice president for a number of years. He will offer to the textile trade the textile chemical specialty products that have been developed in the laboratories of the Raytex Chemical Corp for textile yarn and fabric processors.

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General Aniline & Film Corp has announced the appointment of *John H Shown* to the position of manager—Dyestuff Section, at the Linden, NJ, plant of GAF's General Dyestuff Company Division. *Clarence H Buurman* has been named production manager at Linden, reporting to *John C Lawler*, recently appointed director of manufacturing for GDC.

Until his current appointment, Dr Shown served as section manager, process research and development. In his new post, he will be a member of the staff of *Stiles M Roberts*, technical director, and will maintain headquarters at Linden, where he will be responsible for all dyestuffs process research and development activities.

Dr Buurman was previously area superintendent—vat colors at Linden. In his new capacity he will be responsible for all operations carried out in the Vat Color Department at Linden.

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*Chester M Robbins*, former division vice president of Interchemical Corporation's Finishes Division and director of its sales for flexible plastics, has retired from active management responsibilities but will continue with Interchemical as a consultant and member of its Commercial Development Department. *Gabriel F Goldstein*, formerly manager of the products development laboratory for flexible plastics, has been made director of sales for these products.

Mr Robbins has been associated with Interchemical since 1931 and has served in several pioneering capacities. One was the launching of Aridye pigment colors for printing textiles in the late thirties, while the most recent was the introduction and promotion of Finishes Division materials for use primarily in the vinyl printing and coating fields.

As a member of Interchemical's Commercial Development Department, Mr Robbins will assist in promoting the use and sale of certain organic chemicals and will help evaluate opportunities for Interchemical's expansion in new fields of activities.

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*Charles E Cooper* has joined the sales staff of Carbic-Hoechst Corp and will work from the main office in Mountainside, NJ, calling on dealer and coproducer accounts in the metropolitan New York and New England areas. Carbic-Hoechst is the technical representative and distribuor for Farbwerke Hoechst AG, West Germany.

Prior to joining Carbic, Mr Cooper was associated with Harshaw Chemical Co and National Aniline Div.

Two personnel changes strengthening technical service for the textile industry and new product developments related to textiles have been made by the chemicals division of Shell Chemical Company.

*W J Raab* has been appointed supervisor of the intermediates section of the industrial chemicals department of the technical services laboratory at Union, NJ.

*R C Witman* has been transferred from the technical services laboratory and made a senior technologist in product development at head office.

Mr Raab is a veteran of nearly two decades in basic research with Shell Development Company and in product development at Shell Chemical's head office.

Mr Witman has had extensive and varied experience related to textile treating. His primary interest has been in the field bleaching and durable starch finishing of cotton.

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Joseph Bancroft & Sons Co, Wilmington Del, has announced the appointment of a manager for the Chemical Section.

The new appointee is *Orman B Billings*, former assistant director of special product research for Johnson & Johnson, New Brunswick, NJ.

*Richard Aurich*, who was named assistant manager of the Chemical Section in April 1959, will continue in that position as Dr Billing's assistant.

•

*Everett Charves*, formerly research chemist at Rumford Chemical Works, has been named organic chemist in the high polymer branch of Materials Engineering Laboratory, Naval Air Station, Quonset, RI.

•

General Latex & Chemical Corp, Cambridge, Mass, has announced the election of *William J Watson* as a vice president of the General Latex & Chemical Corporation of Ohio.

Mr Watson will continue his present duties as general manager of the Ashland, O, corporation. Watson joined General Latex & Chemical Corporation as a sales representative in 1956. He was named general manager of the Ashland plant in 1958.

•

*K J Morray* has been named sales manager of the Silicone Products Department of the General Electric Co, Waterford, NY. He succeeds *Thomas J March*, who has taken a new post as manager of sales operations of G-E's newly established internal automation operation in Schenectady.

Mr Morray's office will be located in Waterford, headquarters for sales, manufacturing and research for General Electric silicones. In his new post, he will be responsible for fourteen sales offices throughout the US.

Mr Morray has served the Silicone Products Department as manager of its East Central sales district since 1957.

Robbins

Cooper

Watson

Morray

## Fastness of Textiles to Burnt Gas Fumes

Stanley, E, *Textile Mfr* 86, 456, Nov, 1960

The author states that devising a satisfactory test for fastness to burnt gas fumes has proved to be more troublesome than was anticipated.

After reviewing the current methods of testing for fastness, he discusses another type of fading which is allied to gas fading in that both are caused by minor constituents in the atmosphere. This type is commonly called "O" fading because it is presumed to be caused by ozone.

It had been observed that a number of dyed acetate fabrics, when exposed in various localities under conditions which seemed to rule out the effects of sunlight or gas fumes, faded more rapidly than had been expected as a result of lab tests. Blue dyes, or combinations containing blue, were chiefly affected, including even the gas- and lightfast Eastman Fast Blue GLF. The faded dyeings did not show the typical reddening of shade associated with gas fading, but rather a loss of depth.

Fading was found to vary from place to place and was more severe in June than in January. A surprising feature was that this type of fading was encountered most frequently in non-industrial and country districts rather than in the towns and cities.

After numerous tests it was concluded that ozone was the active destructive agent, and measurement of the amount present in the atmosphere gave figures varying from 0.25 to 6.25 parts per 100 million.

"O" fading has been observed chiefly on acetate fabrics dyed with disperse dyes, but polyesters have shown similar fading. Triacetate which has not been heat-set is even more sensitive than secondary acetate, but its resistance is much improved after heat-setting. Fading on triacetate and polyesters is also reduced if they are dyed with carriers, probably due to better penetration of the dye.

All the usual blue and violet dyestuffs tested, in addition to a number of reds and yellows, were found to be sensitive when exposed to a stream of ozonized air, but fading was reduced by many of the usual gas-fading inhibitors and also by unsaturated compounds such as diallyl phthalate.

The author suggests that the reason why cellulose acetate is more susceptible to gas fading than other fibers is probably that oxides of nitrogen are soluble in this fiber and are retained more tenaciously than in cellulosic fibers, polyesters or polyamides.

He also discusses the search for blue disperse dyes that are more resistant to gas fumes, and the current use of gas-fading inhibitors, eg, triethanolamine.

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## Modified-section Synthetic Fibers

Greenwood, K, *Textile Recorder* 78, 62-3, 113, Nov, 1960

The author describes a new method of increasing the bulk and improving the performance of synthetic fibers by changes in the spinning process. He refers to investigations conducted in East Germany, mostly on polyamide fibers, in which spinnerettes were used with orifices not round but of various shapes.

Profiles of a number of orifices of different shapes are shown, with cross-sections of the resulting fibers. With certain orifices it was found possible to produce hollow fibers.

Out of the large number of different profiles which were investigated, it is stated, three were eventually selected as being most suitable for mass production: a ten-point star for monofilament yarn to be used in stockings, a five-pointed star for use in staple fibers and multifilament yarns, and a three-pointed hollow star for various uses. To these must be added a more recent development: a "glitter" yarn, made from continuous filaments with a three-pointed star profile. This yarn has a "metallic luster" and is used in luxury stockings, gloves, evening gowns, pajamas, etc.

Continuous filament yarns of the modified fibers are said to be virtually equal in breaking strength to corresponding unmodified filament yarns.

Tops from hollow fibers, the author says, are certainly much bulkier than those from normal round fibers, and, similarly, knitting yarns of equal count are 40 percent bulkier and much softer when spun from hollow fibers. The bulkiness of the sliver, however, said to be 40 percent greater than with normal round fibers, leads to reduced cohesion between the fibers, and a special finish is required.

Comparative tests on fabrics containing normal and hollow fibers indicated that the latter had greatly increased wear resistance and much less tendency to form pills.

Filament fabrics produced from hollow fibers are also said to have considerably improved cover and, as would be expected, their hand is warmer. Garments are said to have a wool-like character.

This research and development work seems to be of great importance.

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## Dyeing and Finishing Fabrics Containing Tricel Triacetate Fiber

Mann, R J, *J Soc Dyers & Col* 76, 665-72, Dec, 1960

In secondary cellulose acetate fibers, approximately two-thirds of the available hydroxyl groups are replaced by acetyl groups. In triacetate the replacement of hydroxyl groups is substantially complete.

The triacetate fiber has less tendency to deformation at high temperatures when wet than the Dicel fiber, and this tendency is further reduced by heat setting.

There are three possible processes for setting Tricel: dry heat, steam, and solvent setting. Steam-setting would be an ideal method, producing minimum loss of strength and minimum reduction in the rate of dyeing, but unfortunately it produces "watering", which is particularly apparent in heavy shades. It is therefore impracticable commercially, the author says.

Dry-heat setting can be achieved either by means of hot air (on a tenter frame) or by contact with hot cylinders. Each method has its advantages, which are discussed.

Solvent setting, eg, with diethylene glycol, is moderately effective but difficult of application.

Tricel is more resistant to alkalis than Dicel, but can be saponified by caustic soda. Slight saponification has two advantages: it reduces the slight but appreciable stiffening produced by dry-heat setting, and it assists further softening by finishing agents.

Certain dyes on Tricel, as on Dicel, are subject to gas-fume fading, which may be minimized by selection of suitable dyes or by the use of inhibitors. Slight saponification also has a considerable inhibiting effect.

Dyeing of Tricel is discussed at great length. The new fiber dyes more slowly than Dicel. Open-width dyeing is done on the jig, with addition of carriers for

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full shades. An alternative is the use of temperatures above 100°C; suitable machines are described. Rope-dyeing is conducted on the winch, generally of the shallow type. Fabric tensions are kept as low as possible. Tricel fabrics must be relaxed by some form of wet treatment in open width before being run in rope form.

Dyes for Tricel must be selected with the ultimate use in mind. Since one of the outstanding properties of Tricel is its suitability for durable pleating, this operation frequently follows dyeing, and the dyes used must withstand such treatment. A list of suitable disperse dyes is appended.

Finishing of Tricel fabrics follows the general practice for similar constructions made of Dicel. Crease-resist, "minimum-care", and other finishes are described.

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## Recent Developments in the Dyeing and Printing of Dynel Synthetic Fiber

McLeod, D J, *Can Textile J* 77, 47-50, Dec 23, 1960

New pile-fabric developments requiring a variety of shades have led to an increasing usage of dyed Dynel staple fiber. A new approach to stock-dyeing Dynel, involving lower temperatures and the use of dye carriers, has been developed by the Union Carbide Chemicals Co. Several advanages are afforded by this new technique, including less fiber packing, less delustering, and easier relustering.

The Dynel fiber has several unique properties which should be recognized by the dyer:

1) It has a high affinity for disperse, cationic and premetallized dyes.

2) It is thermoplastic, and subject to softening above 170°F when wet, or 250°F when dry. Temperature control in dyeing and finishing operations is "most important".

3) It loses its natural luster when subjected to hot water or wet steam. Application of dry heat is necessary to bring back the luster.

4) Antifoaming agents improve dyeing and are essential in closed equipment.

The following general procedures for stock-dyeing Dynel fiber illustrate the steps that have to be taken on account of the thermoplasticity of the fiber, when dyeing at the boil:

Closed machines are recommended. An antifoam emulsion is first added to the dyebath. The staple fiber is then introduced and packed uniformly. Dyeing is carried out in the usual manner, at a temperature of 210-212°F. Cationic dyes require the addition of an anionic and a nonionic wetting agent. Disperse dyes call for an anionic wetting agent and sodium tripolyphosphate. Neutral-dyeing premetallized dyes are applied like disperse dyes but require also ammonia. Full instructions are given for applying all three classes of dyes.

Tight caking which is difficult to open occurs if cooling of the dyebath is accomplished too quickly. Washing and scouring are carried out below 170°F. The stock is then opened and dried at a temperature not over 250°F.

Relustering of Dynel fiber takes place instantaneously at 250°F, provided that the stock is dry.

The new technique, involving the use of lower temperatures, calls for an addition to the dyebath of a carrier. Butyl benzoate has been found to be the most effective carrier studied. With this addition, the dyeing temperature required does not exceed 180°F. Full details of the application of disperse and cationic dyes by the new method are given.

The author also describes processes for printing pile fabrics composed of Dynel, or blends with other fibers, to produce imitation fur effects.

●

## Practical Aspects of Dyeing with Procinyls

Blackburn, S, *Man-made Textiles* 37, 77, 79-80, Oct, 1960

The Procinyl dyes are the first range of reactive dyes produced primarily for dyeing nylon. The available water-soluble and disperse ranges of dyes used on this fiber both possess inherent defects, either in fastness or dyeing properties. Thus the advent of the Procinyls, which combine the dyeing characteristics of ordinary disperse dyes with the high wetfastness associated with reactive dyes, constitutes an important advance in the development of dyes for nylon textiles.

The author points out that Procinyl dyes react with the primary amines and also the amide groups of the fiber, so overcoming the low saturation values and poor build-up that would otherwise occur.

Ordinary disperse dyes on nylon, as a class, are level-dyeing and compatible in mixtures, and readily cover the chemical and physical irregularities of nylon, but lack wetfastness. The Procinyls possess all of the above advantages, and in addition, excellent wetfastness.

Dyeing is carried out by a two-stage process in a single bath, the first stage involving exhaustion and leveling in an acid medium, and the second involving chemical fixation in an alkaline medium.

A dye dispersion is prepared by sprinkling the dye powder on to 10-20 times its weight of neutral water. The dyebath is set with acetic acid and a suitable dispersing agent, and the dye dispersion is added. Dyeing starts at 40°C and the temperature is raised to 85-100°C. A pH of 3.5-4.0 should be maintained. After one hour, soda ash is added to bring the pH to 10.0-10.5, and dyeing is continued for one hour. Following rinsing, heavy shades must be soaped to remove loose color.

Much piece dyeing is carried out on open jigs or winches, but enclosed machines are to be preferred, according to the author. Pressurized jigs and beam-dyeing equipment will achieve greater prominence in the future. Procinyl dyes are suitable for application on such machines, he says.

The Pad-Roll technique (using sodium bicarbonate) has been found to yield high color value and wash-fastness with these dyes.

●

## Silicones for Textiles. 1. Manufacture. 2. Application

Smith, C, *Man-made Textiles* 37, #437, 62, 64; #438, 53-5 (1960).

Application of resins to textile fabrics to obtain different properties is now well established in the textile industry. Many new types of resins have been introduced, among them the silicone resins.

The chemistry of the various silicones, and their preparation from chlorsilanes by hydrolysis, are described in considerable detail. The silicone resins used on textiles are made from trichlorsilanes, while silicone rubbers are similarly made from dichlorsilanes.

The silicone application to textiles forms a film around each fiber. The hydrophobic surface of methyl groups in the silicone results in a very high interfacial tension and contact angle with water, and accounts for the excellent water repellency. The fabric so treated also possesses a soft hand as well as enhanced draping qualities, improved abrasion resistance, tear strength and crease recovery.

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The water repellency and permanence of the silicone finish can be further improved by the addition of organic esters of titanium and zirconium. The organic ester type is used when the fabric cannot be heated to polymerize the resin.

By formulating the resin *in situ*, a resinous material is formed from the linear polymer by cross-linking. (This may be compared with the vulcanization of rubber-like polymers..)

Generally for this type of finish two kinds of silicone fluids are used:

1) Dimethyl fluids with or without some Si-OH groups.

2) Methyl hydrogen fluids containing Si-H groups. Normally mixtures of these fluids are used to prepare silicone textile finishes.

Most of these reactions require heat plus a catalyst. Organic salts of zinc, lead, iron, tin or cobalt are used for this purpose.

Silicone resins have the following properties: low boiling point, low viscosity, small change in physical properties with temperature, and a low surface tension. This last property is important, as the silicone fluids easily wet-out the fabric during the application of the finish.

Silicone resins are applied to the fabric as a final treatment after scouring and dyeing. It is necessary to remove all spinning oils, sizing agents and dyeing assistants from the fabric to ensure satisfactory results.

Fabrics treated with a small percentage of silicones will give a finish that will confer some degree of water repellency and resistance to a wide variety of aqueous staining fluids (eg, milk, beer, coffee, fruit juice, etc). These stains are easily removed from the treated fabric by sponging.

Silicones can also be used as softeners with crease-resist resins in "wash-and-wear" finishes. They increase the tear strength, abrasion resistance and crease recovery of the fabric.

•

## Some Other Uses of Fluorescent Brighteners

Duerig, G, *Ciba Rev* #140, 23-4 Oct, 1960

At the present time there are few white fabrics in commerce which have not had their whiteness improved by means of fluorescent brighteners, the author states. Pale pastel shades, too, owe their clear and bright hues to fluorescent whitening agents.

But textiles are not the only field in which these brighteners are used. In the paper-making industry they came as the answer to a long-standing need for intensely white papers. Nowadays, papers containing not more than about 10-20 percent of mechanical wood pulp are brightened by adding the optical whitener to the stock in the beater, on the paper machine, or to the finished product.

The largest consumer of fluorescent brighteners, however, is doubtless the soap and detergent industry. Practically all present-day soaps and detergents contain these whitening agents. It is estimated that in 1959 about 2410 tons of brighteners were used by the soap and detergent manufacturers alone.

The cosmetics industry uses fluorescent brighteners for the manufacture of whiter pastes or as ingredients in shampoos and hair-tinting preparations. The chemical inertness possessed by these optical whiteners is an advantage compared with the oxidizing and reducing bleaches previously used.

The whitening effect of optical brighteners also serves to heighten the brilliance of nail varnishes and lipsticks, and they have a prominent use in permanent wave preparations, imparting an attractive sheen to the hair.

Optical brighteners which have been tested and found to be harmless are also available for improving the appearance of certain foodstuffs, eg, flour, sugar and rice.

The intense fluorescence of the optical brighteners is utilized in marking inks of various kinds, readily visible under u v light, as an aid to the textile converter and drycleaner.

Optical brighteners of the stilbene type carrying acid groups have been found to be suitable as mordants for basic dyes.

Finally, the growing use of these products in lacquers, molding compounds, and plastics generally should be mentioned. They are said to enhance the stability of plastics to the effects of radiation, while at the same time protecting them against yellowing.

# GENERAL CALENDAR OF COMING EVENTS

**ACHEMA**
June 9-17 (13th International Chemical Engineering Exposition and Congress———Frankfurt am Main, Germany)

**AMERICAN CHEMICAL SOCIETY**
Mar 21-30 (139th National Meeting, St Louis, Mo)

**AMERICAN COTTON MANUFACTURERS INSTITUTE**
Mar 23-25 (12th Annual Meeting, Fontainebleau Hotel, Miami Beach, Fla)

**AMERICAN HOME ECONOMICS ASSOCIATION**
June 27-30 (52nd Annual Meeting———Cleveland, Ohio)

**AMERICAN OIL CHEMISTS' SOCIETY**
May 1-3 (34th Annual Meeting, Sheraton-Jefferson Hotel, St Louis, Mo)

**CHICAGO SECTION, AMERICAN CHEMICAL SOCIETY**
Sept 5-8 (11th National Chemical Exposition———Chicago Amphitheatre, Chicago, Ill)

**FIBER SOCIETY**
April 27-28 (Spring Meeting———Georgia Center for Continuing Education, Athens, Ga)

**INTER-SOCIETY COLOR COUNCIL**
April 10-12 (30th Annual Meeting———Sheraton Hotel, Rochester, NY)

**INTERNATIONAL TEXTILE MACHINERY EXPOSITION**
1962 (3rd Exposition, Hanover, Germany)

**KNITTING ARTS EXHIBITION**
April 24-28 (Atlantic City Auditorium, Atlantic City, NJ)

**NATIONAL COTTON COUNCIL OF AMERICA**
Nov 8-9 (1961 Chemical Finishing Conference———Sheraton Park Hotel, Washington, DC); Oct 3-4, 1962 (1962 Chemical Finishing Conference———Sheraton Park Hotel, Washington, DC)

**PURDUE INDUSTRIAL WASTE CONFERENCE**
May 2-4 (16th Conference———Purdue Memorial Center, Lafayette, Ind)

**QUEBEC SECTION, CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS**
Mar 18 (Physical Sciences Centre, McGill Univ, Montreal, Quebec); Apr 21-22 (Annual Meeting and Dinner, Sheraton-Mt Royal Hotel, Montreal, Que); June 10 (Annual Golf Tournament—Drummondville Country Club, Drummondville, Quebec)

**SCHWEIZERISCHER VEREIN DER CHEMIKER-COLORISTEN**
October 12-14 (Symposium on "Permanent Finishing 1961"——— Swiss Federal Institute of Technology, Zurich, Switzerland)

**SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES**
Mar 14, Apr 13 (Luncheon Meetings———Palm Terrace Suite, Hotel Roosevelt, New York, NY); May 22-24 (Spring Outing——— Skytop Lodge, Skytop, Pa); June 13, Sept 12, Oct 10, Nov 14 (Luncheon Meetings———Palm Terrace Suite, Hotel Roosevelt, New York, NY); Dec 7 (Annual Meeting and Dinner———Hotel Roosevelt, New York, NY)

**TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY**
Feb 20-23 (46th Annual Meeting———Hotel Commodore, New York, NY)

**UNION OF PURE AND APPLIED CHEMISTRY**
August 6-12 (18th International Congress of Pure and Applied Chemistry———Montreal, Canada)

**WORLD CONGRESS FOR MAN-MADE FIBERS**
May 15-18, 1962 (2nd World Congress, London, England)

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**Advertisements in this section are restricted to HELP WANTED — POSITION WANTED — EQUIPMENT wanted or for sale. Rates, effective February 1, 1951; One-time, $14.00 per column inch; 13 or more times, $12.00 per column inch: Position Wanted, $4.00 per column inch. Figure 38 average words per column inch. Publisher reserves the right to reject or discontinue any classified advertisement. Replies should be addressed: Box Number ..... c/o American Dyestuff Reporter, 44 East 23rd Street, New York 10, N. Y.**

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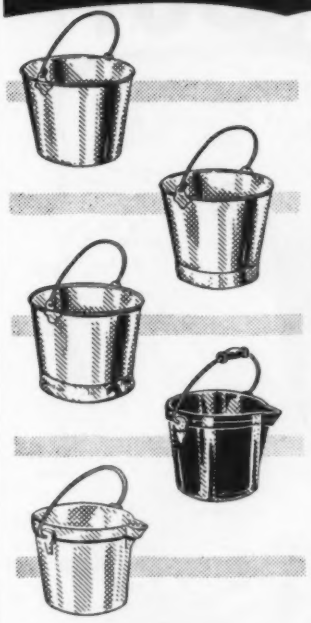

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## KNITTING ARTS EXHIBITION NUMBER

Publication Date April 17, 1961

* Advertising Closing Date March 27, 1961

This important Issue, published every other year, will cover the biennial Knitting Arts Exhibition, to be held April 24 to April 28 in the Atlantic City Auditorium.

*AMERICAN DYESTUFF REPORTER'S KNITTING ARTS EX*-HIBITION ISSUE will carry full descriptions of all wet-processing exhibits, plus other editorial material and background details, giving over 10,000 readers the full story of this Important Exhibition.

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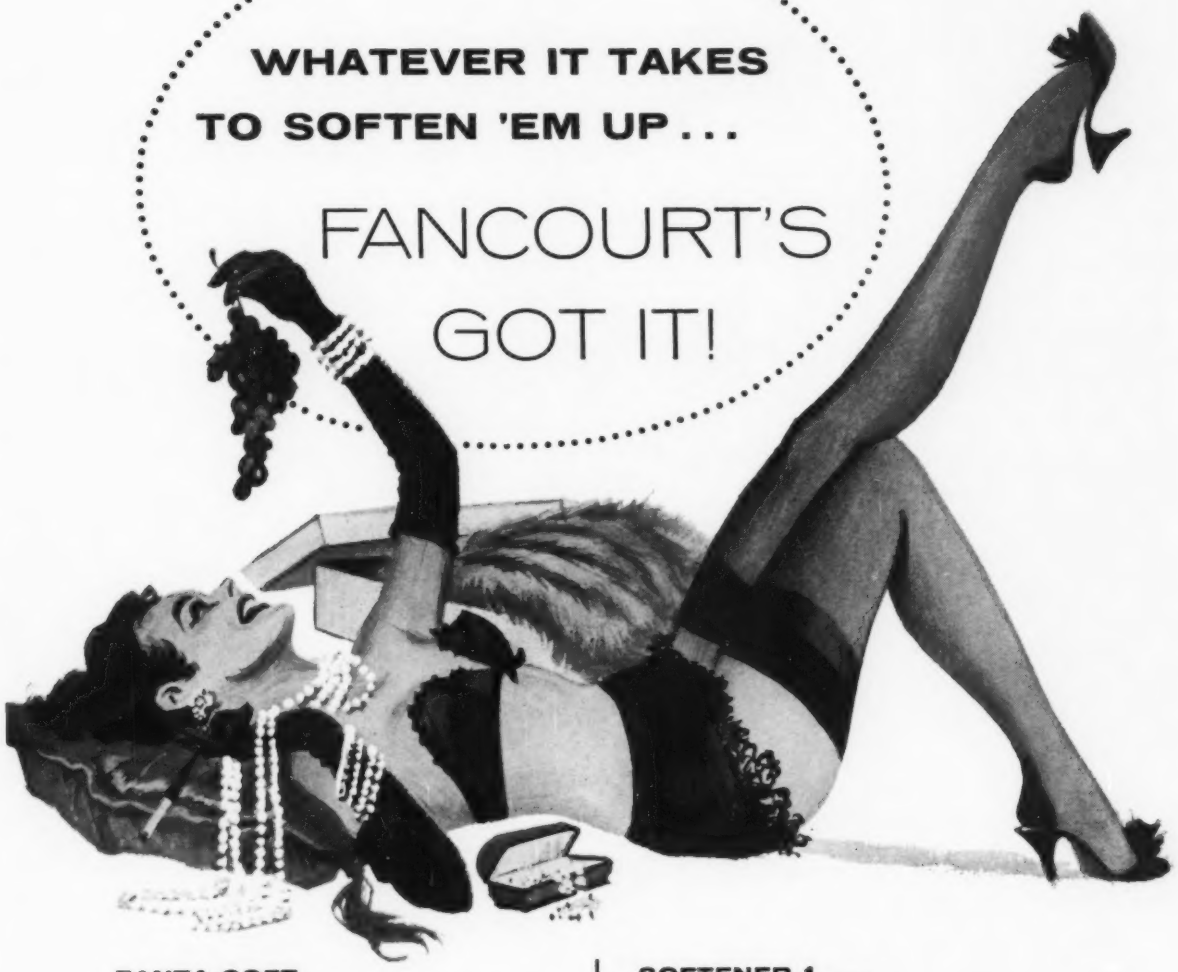

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